ELECTRICAL WORLD

A McGRAW-HILL PUBLICATION

In This Issue

LOAD BUILDING—WHERE IS IT HEADED?

A survey of the candid opinions of power company sales executives

25 YEARS OF TURBINE OIL SATISFACTION

THE CHESAPEAKE CORPORATION OF VIRGINIA at West Point, Va., utilizes seven Westinghouse turbines with a total capacity of 15,250 kw. Their Chief Engineer writes: "Ever since our first turbine was installed 25 years ago, we have used Texaco continuously without interruption in our systems, and have not lost a bearing or experienced any mechanical failure due to lubrication."

Let Texaco Regal Oils (R & O) keep *your* turbines as trouble-free as these

Assured freedom from sludge, rust and foam . . . full bearing protection under the severest conditions . . . ever-responsive governor action . . . extra long oil service life . . . you get all these benefits with *Texaco Regal Oils (R & O)*.

Turbine manufacturers recommend the use of oils with rust and oxidation inhibitors. But additives have value only when the oil is basically good. *Texaco Regal Oils (R & O)* are made of choice petroleum stocks, carefully selected and refined. They contain rust and oxidation inhibitors and are especially processed to prevent foaming . . . to give extra protection.

Thus, you can count on *Texaco Regal Oils (R & O)* for an extra margin of safety. *Texaco Regal Oils (R & O)* meet the stringent requirements of all leading turbine builders.

Let a Texaco Lubrication Engineer explain specifically how *Texaco Regal Oils (R & O)* can improve turbine performance . . . and how you can benefit by using Texaco lubricants throughout your plant. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Regal Oils (R&O)

FOR ALL TURBINES

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

Of Personal Interest

West Penn Power Co had to have a transmission line operating just a year from the day it was authorized. Conventional construction methods would take two years, at least—the line ran through the middle of the thickest woods and the most rugged mountains in Pennsylvania.

G. B. (Speed) Hoffman tells in the April 10 issue of Electrical World how he and his hard-working helpers got the line working in 13 months. To survey that patch of woods, Speed used aerial photography, plotting the ground profile with a Kelsh plotter which uses filtered light to make aireal photographs three-dimensional. On the ground, where woods were too thick for daytime surveying, he worked at night, beaming a searchlight straight up in the air. The transit man could sight on the vertical shaft of light from as far as five miles away. Speed's methods saved a year's surveying time. You'll want to read "Aerial Profiling of 132 Kv Line Cuts Engineering Cost in Two."

Shadow of Coming Events

Now we know at least one instance where industry is putting atomic by-products to work. Detroit Edison uses radio-active tracers to study technology of insulating oils. Results are interesting. See Andrew Gemant's article in the April 10 issue.

Power Pits

You've noticed those little trucks that come scooting out on the field and plug into an airliner after it lands, to feed energy into the plane's power system while its generators are idle.

They are inconvenient and bothersome. Power pits seem to be the dependable and efficient answer. How they work is revealed by Morris Brenner of Burndy Engineering Co, and E. S. Hamm of Northwest Airlines, in "Power Pits for Airports" (another highlight of the April 10 issue). The article was edited by E. W. Associate Editor Bob Blatt, who flies his own plane and has spent plenty of time around airports. During the war he was chief airport lighting engineer for CAA.

In May, Bob will fly to Florida, visiting utility companies enroute. His Electrical World beat extends from Washington, D. C. to New Orleans so he finds an airplane a handy thing to have around.

Cordially,
THE EDITORS

ELECTRICAL WORLD

Published for 76 years for those engaged in the business of generating, transmitting, distributing or applying electric power

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Let's Look at Load Building 83

Results of a survey whose purpose was to give the low-down on load building today. Anonymity of replies enabled sales executives to speak frankly of the problems that confront them and to give opinions without pulling punches. Conclusion is that, with a few outstanding exceptions, power company sales departments are not yet adequate for the necessary load building job

Binary Cycle At Schiller Station ..... By H. D. Resseguie 99

Design features of first coordinated mercury-steam station in U. S. take advantage of 36-37% thermal efficiency of binary cycle. Economy guaranteed is 9,200-9,400 Btu per net kw for oil and coal. Cost for 25,000-kw steam turbine and two 7,500 mercury units is $325 per kw

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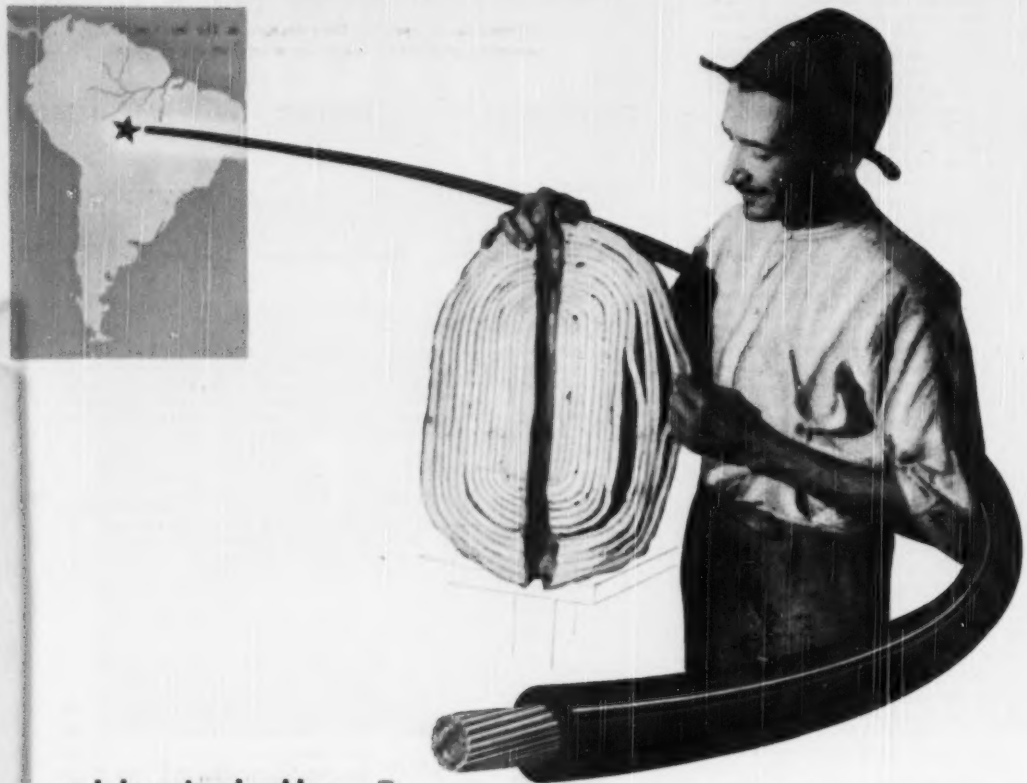
in cable insulation... there's nothing like NATURAL RUBBER



...and, in natural rubber, there's nothing like WILD UP-RIVER FINE PARA

The first, and most important, thing about cable insulation made with natural rubber is that its long life and stability *have been proved dependable* over a period of nearly 75 years.

This is the record of Okonite cables made with one particular type of natural rubber—wild Up-River Fine Para from South America's Amazon Valley. It's the only kind of rubber used for the insulation in Okonite and Okolite cables. And it's one basic reason why the insulation in countless Okonite cables, examined after 20, 40, and even 50 years in service, has stayed elastic and electrically sound.

Though Okonite research engineers were the first to employ man-made synthetics in wires and cables, their experience has taught them that these materials have limitations as well as advantages. This same long experience has also taught them that you dare not place the same reliance on *anticipated performance* based on laboratory tests that you can on *established records* gained from years of operating insulated cable under actual service conditions.

That's why Okonite continues to make cables with NATURAL RUBBER—Up-River Fine Para rubber—and recommends them with full confidence wherever long life and circuit security are first considerations.

If you would like to have more information on the importance of cable insulation made with natural rubber, just ask for Research Publication EW-1014 The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 *insulated wires and cables*

8147

ANCHORAGE for the NEUTRAL SUPPORTED SYSTEM OF SERVICE DROPS . . .

PAT. PEND.

Electroline Automatic Dead End

The 3800 Series Service-Drop Automatic Dead End, for holding pre-assembled service cable that uses a bare neutral conductor as the messenger. This service-drop dead end is assembled as a one-piece unit, with no loose parts to be dropped or lost. It has one end of the flexible bail detachable for installation around a spool type insulator or other supporting anchorage—permitting quick and easy installation. Only one part, other than the conductor, is handled by the lineman. This Electroline Automatic Service-Drop Dead End can be reclaimed and used again. But, once it is installed, it cannot become detached until conductor is removed by the lineman. The practice of gripping the bare neutral employed by the Electroline method of dead ending eliminates the danger of destroying the insulation and short circuiting phase wires.

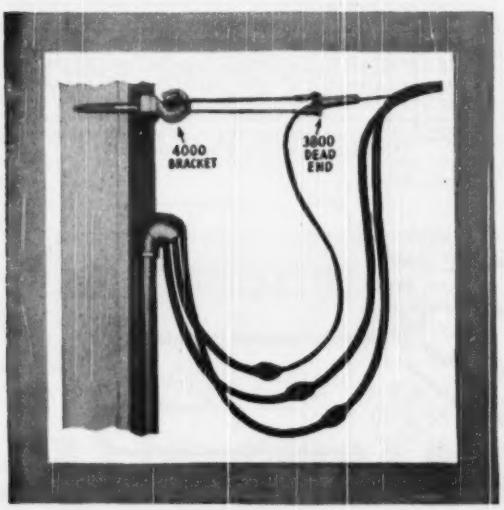
Electroline Anchor Bracket

The 4000 Series Service-Drop Anchor Bracket securely supports the cable at any angle. It is so designed that a closed bail or loop can be easily inserted without opening the loop. This one-piece, light weight unit reduces installation costs and no previous experience is necessary to install it.

The 4000 Bracket eliminates the insulator and insulator hardware at the building.

Two types are available: one with a ½" diameter galvanized lag screw in lengths from 3" to 5" inclusive. The other type contains a ½-13 galvanized nut for use in installations where a threaded end of bolt extends through wall of building.

The Electroline 4000 Series Anchor Bracket is made of aluminum and a galvanized steel lag screw, or nut to withstand corrosion and the discoloration of outside building walls . . . it is vibration-proof and fool-proof.



Both the Electroline Service-Drop Automatic Dead End and Anchor Bracket are designed to harmonize with residential and commercial buildings.

Write for new bulletins for complete details.

Electroline Company

4121 South La Salle Street Chicago 9, Illinois

IN CANADA
POWERLITE DEVICES, LTD., TORONTO

NEW, LARGER CRESCENT WIRE GRIP

● The newest member of the Crescent line of Wire Grips offers increased Capacity and Strength. The new Crescent #386 handles wire up to 1-1/16 inches ...the illustration shows it gripping a 600,000 C. M. Conductor. Each Crescent Grip is factory tested to its full safe load. Every Crescent Grip is drop-forged and heat-treated. Crescent Grips won't slip or jam, easily released. Available in two Jaw Types...Regular with corrugated jaws for bare or insulated wire and Smooth for aluminum wire, cadmium-plated finish. Equipped with ring at top for hot line hook and special hook which prevents grip from dropping off wire. Other types of Crescent Grips are illustrated in the Crescent Catalog. Write for a copy.

GRIP CAPACITIES — LOADS — WEIGHTS

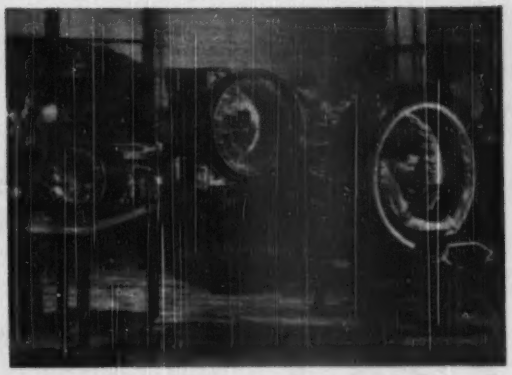
No.	Max. Cap.	Min. Cap.	Wt. Lbs.	Eye Opening	Weight
383	3/8" (.375)	5/32" (.156)	5,000 lbs.	1⅛ x 1⅛	2 lbs.
384	7/16" (.437)	1/4" (.250)	7,500 lbs.	1¼ x 1¾	3⅜ lbs.
385	13/16" (.812)	3/8" (.375)	10,000 lbs.	1¼ x 1¾	4¾ lbs.
386	1" (1.000)	5/8" (.625)	12,500 lbs.	1⅞ x 2⅛	8½ lbs.

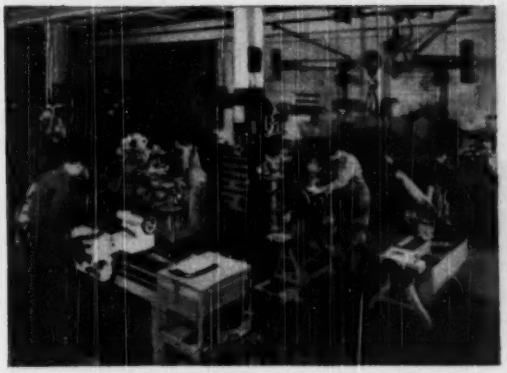
NOTE: Add -2 to catalog number if you want smooth jaw Grip for Aluminum Wire. Example 383-2.

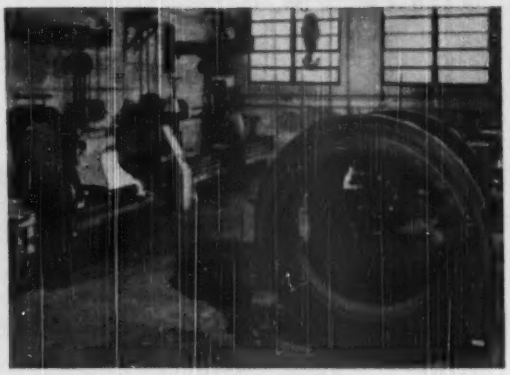
EVERYBODY RECOGNIZES QUALITY by this Trade-mark

"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK







For Any Size Motors

DEPEND ON REPAIR SERVICE LIKE THIS!

Example: a Midwest Utility recently burned out a vital 75 hp motor. They called Chicago Electric, their nearby A-C Certified Service Shop, at 11:00 a.m. At 4:00 p.m. the same day, Chicago Electric had the unit repaired and back in service! Total time: 5 hours.

WHEREVER YOU ARE, you can get quick, dependable service from your nearby A-C Certified Service Shop, for there are over 75 such shops in all major industrial areas.

These shops have been selected on the basis of, 1) quality of their work, 2) facilities, and 3) their community reputation. They maintain experienced personnel and use factory parts or parts of equal quality. They can be relied on for good work at honest prices.

When you need this kind of repair service on motors, controls or transformers, call your nearest Allis-Chalmers Certified Service Shop.

Need New Motors Or Starters?

For motors from one hp up to the largest sizes — with Allis-Chalmers controls to match — call your nearby A-C Dealer or Sales Office.

A-2949

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

HAVE YOU SWITCHING

① Where Horn Gap Switches Are Inadequate

because they cannot, under all conditions, safely break magnetizing or charging currents; nor can they interrupt load currents

② Where Circuit Breakers Are Becoming Too Expensive

for non-automatic switching and short circuit protection

Two three-pole, group operated, 7,500-volt, 400-ampere, Alduti Interrupter Switches vertically mounted back to back, in 2,300-volt overhead loop circuit tap to load center substation in building below.

Price each, including operating mechanism, $490.00. Single pole stick operated switch prices as low as $65.00.

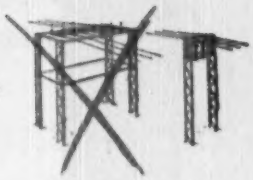
Alduti Interrupter Switches are supplied in the following sizes:

Volts	Continuous Amperes	Interrupting Amperes
For hook stick or group operation		
7500 & 15000	400, 600, 1200	400
For group operation only		
23000 & 34500	600	600

APPLICATIONS . . . . .

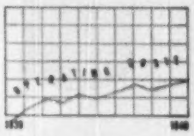
③ Where Structure Design Is Restricted

because horn gap switches can be mounted only in the horizontal upright position, need wide phase spacings, and always require an operating mechanism



④ Where Switching Sequences Are Too Complicated And Costly

because multiple operations—involving breakers, disconnects, and operating personnel—are required to isolate equipment or sectionalize circuits



ALDUTI INTERRUPTER SWITCHES

offer a proved and economical solution to such application problems.

Ten years of actual operating experience in thousands of installations, and many field trials under inordinately severe test conditions, have demonstrated convincingly the ability of these Interrupters to—safely and repeatedly—

Sectionalize either radial or loop distribution and subtransmission circuits, under either load or charging current conditions...

Switch load and magnetizing currents of transformer banks...

Switch charging currents of capacitor banks.

Because there is NO EXTERNAL ARCING during the operation of Alduti Interrupters: they need not be mounted only horizontally upright, but can also be mounted vertically, or horizontally underhung; hook stick operation can be employed where economy dictates; and phase spacings can be reduced to 18 inches for the 7,500-volt and 39 inches for the 34,500-volt switches. Hence structures can be smaller, connections simpler, and construction cost can be reduced below that of installing horn gap switches. Also, Alduti Interrupters can be installed in cubicles, thus providing—even for subtransmission applications—enclosed "packaged-type" switches, thereby permitting the complete enclosure of all components of a unit-type substation.

When combined with S & C Power Fuses, Alduti Fused Interrupters also provide short circuit protection with fault current interrupting ability up to 40,000 amperes asymmetrical, thus making possible the elimination of expensive circuit breakers where automatic switching is not required.

OPERATING, CONSTRUCTION, AND MOUNTING DETAILS, INTERRUPTING RATINGS, AND FIELD TEST REPORTS WILL BE MAILED ON REQUEST

S & C ELECTRIC COMPANY
4421 Ravenswood Avenue
Chicago 40, Illinois

☐ Please send complete information on ..... 7.5 kv, ... 15 kv, ... 23 kv, ... 34.5 kv Alduti Interrupter Switches

☐ Have representative call

Name ..... Title .....

Company .....

Street & Number .....

City ..... Zone ..... State .....

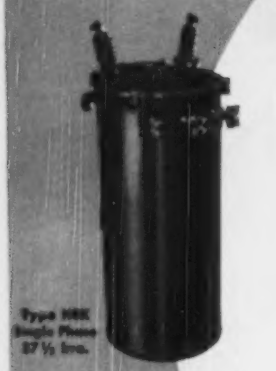
S & C COMPANY

SCHWEITZER & CONRAD, INC.

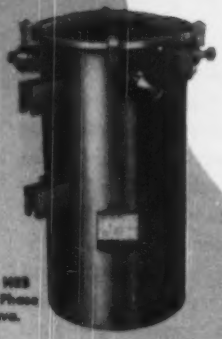
Wagner Distribution Transformers

are Standardized in every rating and design

IN ACCORDANCE WITH E.E.I.–NEMA FOURTH REPORT



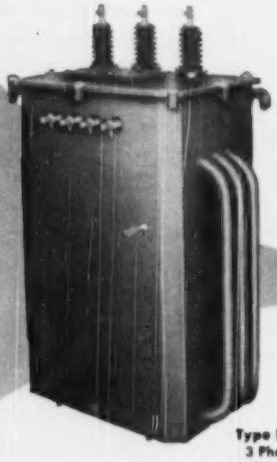
Type HSK
Single Phase
37½ kva.



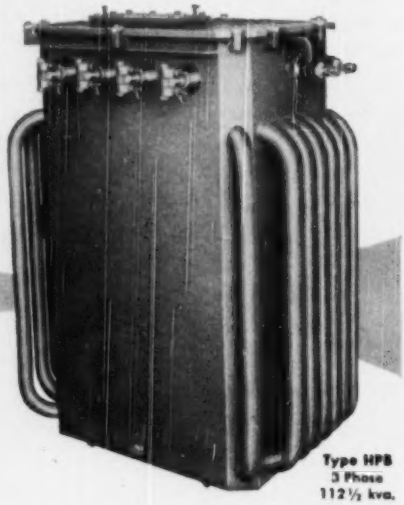
Type HSB
Single Phase
15 kva.

Type HSX
Single Phase
100 kva.

Wagner's complete line of distribution transformers includes every rating and design listed in the E.E.I.—NEMA Fourth Report—no matter what your particular requirements may be . . . there's a Wagner transformer to fit your needs.



Type HPK
3 Phase
45 kva.



Type HPB
3 Phase
112½ kva.

You save time, money and worry when you make your selection from Wagner's widely diversified line of distribution transformers—you get the benefit of Wagner's quality construction, improved design, and high efficiency with *standardized* mechanical features in ratings of 500 kva and below—15,000 volts and below.

Wagner has a nationwide organization to provide fast, convenient service, with 29 branch offices in principal cities ready to help you with your transformer problems. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.

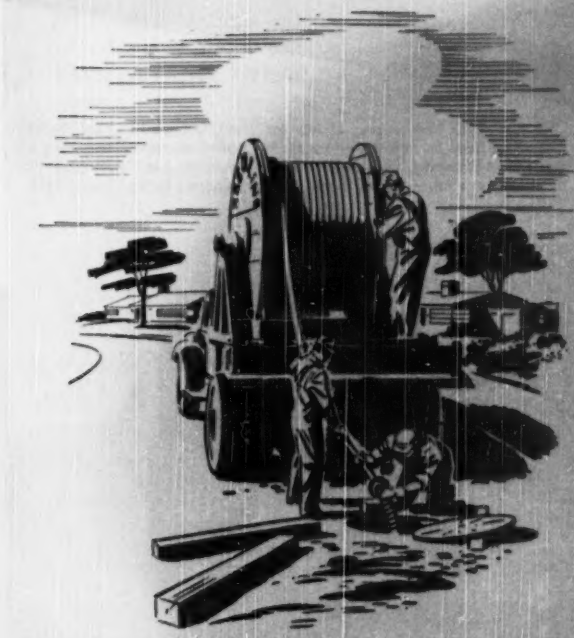
Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

Today it's Roebling!



Unsurpassed service at lowest cost with Roebling Paper Insulated Cable

YOU NEVER WANTED ECONOMY MORE than you do today . . . and you'll get it by putting circuits underground with Roebling Paper Insulated Lead Encased Cables! No more unsightly overhead lines with their expensive upkeep . . . trouble-free service, uninterrupted and dependable, is yours for years on end.

Roebling Shielded Type H is outstanding for 3-phase grounded neutral circuits from 13 to 33kv. It is available in single and multiple conductor construction, in regular and Compack strand (round or sector). Conductors are shielded with metallized paper, individually insulated, protected with perforated copper shielding tape, and the whole assembly served with a bronze binder tape and lead sheathed. Similar assemblies can be made to your special specifications.

Your nearest Roebling office and sales engineer will be glad to help you select the *right* cable for top performance and economy. John A. Roebling's Sons Company, Trenton 2, New Jersey.

There's a Roebling electrical wire or cable for practically every transmission, distribution and service requirement. All of them are made completely in Roebling plants where the most modern techniques and precision machines assure products of the very highest quality.

ROEBLING

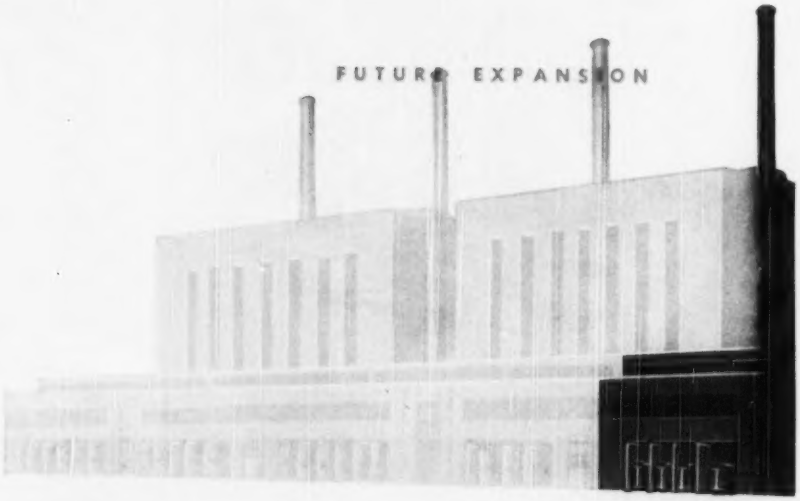
A CENTURY OF CONFIDENCE

Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Road ★ *Cincinnati*, 3253 Fredonia Ave. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 4801 Jackson St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. Twelfth St. ★ *Portland*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 Seventeenth St. ★ *Seattle*, 900 First Avenue S.

SUNBURY

a tradition of leadership

On the evening of July 4th, 1883, Thomas A. Edison placed in operation the first three-wire central station electric lighting plant in the world at Sunbury, Pa. Power was supplied to the old City Hotel three blocks away which was then on the site now occupied by the Hotel Edison.



The world's largest power plant using pulverized anthracite has been completed recently on a site near Shamokin Dam along the Susquehanna River about two miles below Sunbury, Pa. This 150,000 kw installation, first of a number planned for the site, is part of the Pennsylvania Power & Light Company's network serving 28 counties which cover an area of 9,500 sq miles in central eastern Pennsylvania.

The two 75,000 kw turbine generators are served by four 130-ft high Foster Wheeler Steam Generators, the largest ever built for direct firing of pulverized anthracite.

An extension of 100,000 kw capacity, now under construction, will be completed in 1951 and equipped with Foster Wheeler Steam Generators.

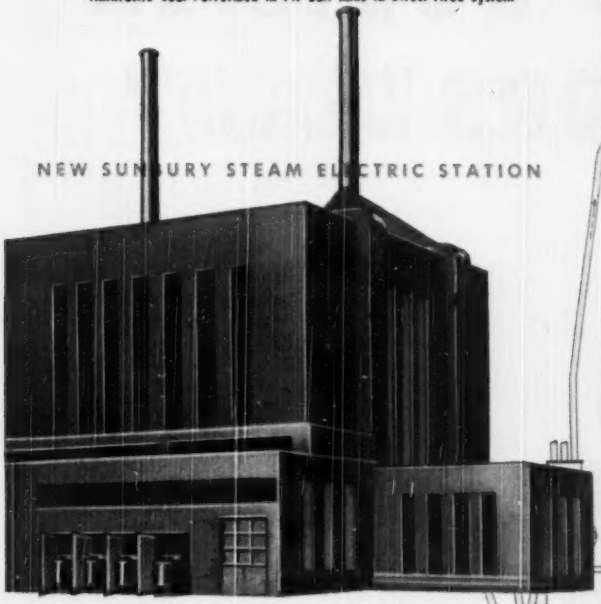
FOSTER WHEELER CORPORATION • 165 BROADWAY

still tops the way

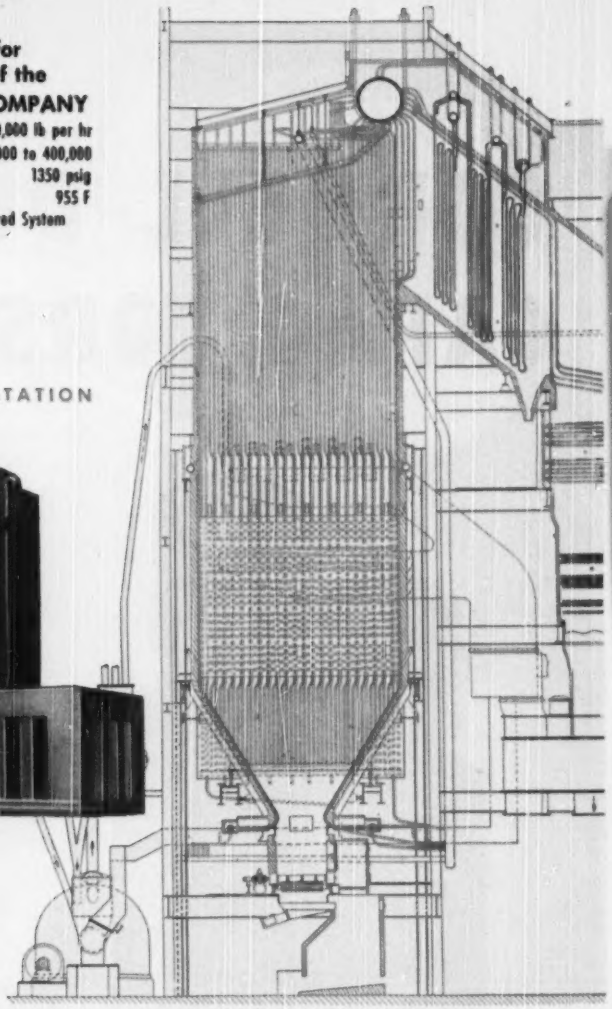
Four FOSTER WHEELER Units for Sunbury Steam Electric Station of the PENNSYLVANIA POWER & LIGHT COMPANY

Capacity	400,000 lb per hr
Superheat Control Range	250,000 to 400,000
Pressure Superheater Outlet	1350 psig
Final steam Temperature	955 F

Anthracite Coal Pulverized in FW Ball Mills in Direct Fired System



NEW SUNBURY STEAM ELECTRIC STATION

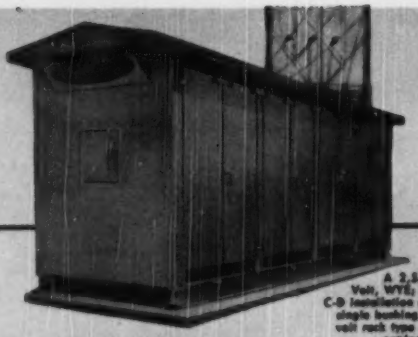


Each steam generator is equipped with two Foster Wheeler ball mill pulverizers which have a combined output of 27 tons of coal per hr.

FOSTER WHEELER

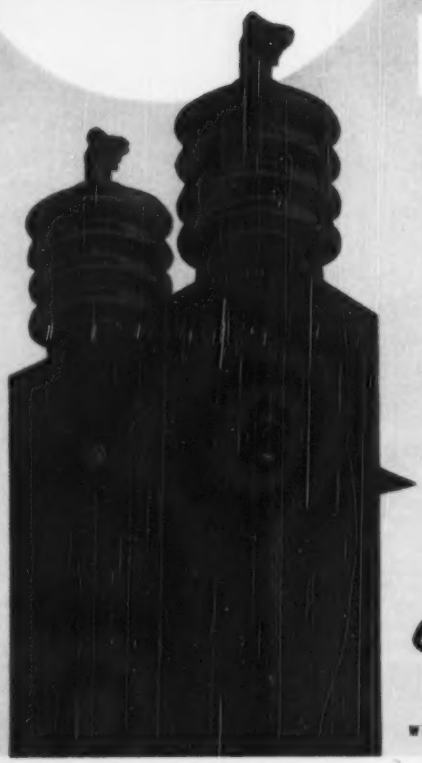
NEW YORK 6, N. Y.

SPECIALIZATION PAYS DIVIDENDS... when utilities install



A 2,520 Kvar, 12,470 Volt, WYE, isolated neutral, C-D installation consisting of 168 single bushing, 15 Kvar, 7,200 volt rack type capacitors, 16 on outdoor, weather-proof housing, with temperature-controlled, forced ventilation.

CORNELL-DUBILIER CAPACITORS FOR POWER-FACTOR IMPROVEMENT



That C-D specialization pays dividends is proved by the more than a decade of trouble-free field service delivered by C-D capacitors. It's the kind of equipment you can install and forget, proving once again that *the specialist does it best.* Next time specify C-D—the better capacitor. A C-D field engineer will be glad to discuss with you capacitors designed for your specific power-factor improvement needs. Your inquiry is cordially invited. Catalog on request. Cornell-Dubilier Electric Corporation, Dept. D-36, South Plainfield, New Jersey. Other plants in New Bedford, Worcester, Brookline, Mass.; Providence, R. I.; Indianapolis, Ind. and Cleveland, Ohio.

Follow the leaders

Demand dependable C-D Capacitors—built by capacitor specialists.

C-D Best by Field Test!

1910 1949

Reg. U. S. Pat. Off.

WORLD'S LARGEST MANUFACTURER OF CAPACITORS

DEPENDABLE ALWAYS!!

Whichever the season, there's seldom any worry about overhead power lines, or customer relations either, when Simplex - ANHYDREX Self - Supporting Aerial Cables are on the job. Anhydrex insulated and neoprene jacketed, they assure trouble-free service year in and year out in any location, and their modern construction does away with the need for excessive tree-trimming.

Anhydrex has excellent electrical properties and is the most stable of all rubber insulations when exposed to water and moisture. The tough neoprene jacket withstands abrasion caused by swaying limbs and chafing against poles and it provides effective protection against fungus, heat, sunlight and weathering.

ANHYDREX Self-Supporting Aerial Cables require little or no tree trimming for installation. The circuit is entirely insulated, and the copper bindings that secure the conductors to the messenger provide a grounded path on the outside. During storms the strong supporting messenger retards line breaks due to falling limbs and ice-loading. Even when poles fall, the well-protected cables will usually continue to operate efficiently.

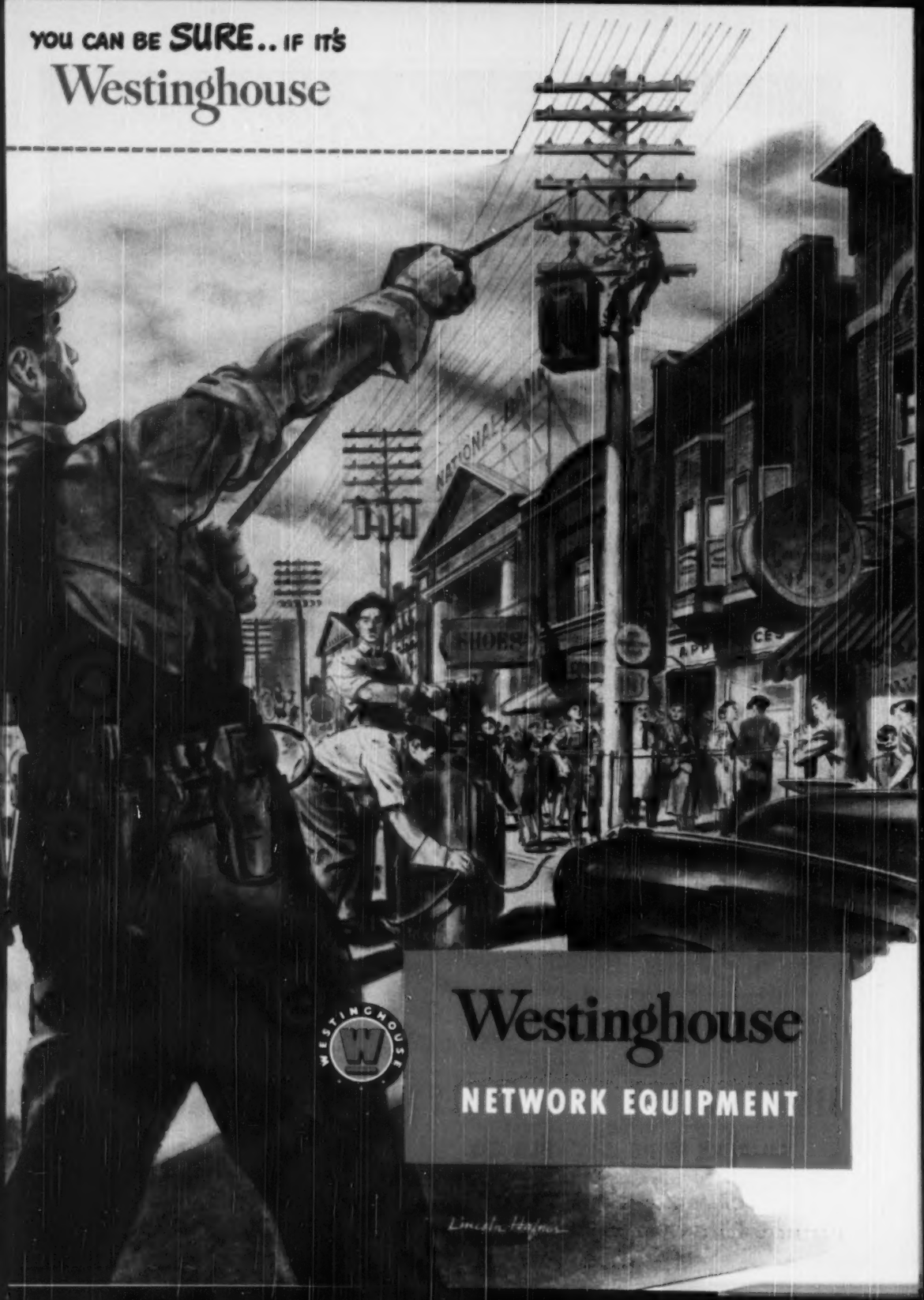
ANHYDREX Self-Supporting Aerial Cables are delivered ready for installation. They can be clamped to poles already standing. Crossarms and insulators are unnecessary. Few workmen and comparatively little time are needed for the job. But these are but a few of the advantages they provide. For the complete story, simply fill in and return the coupon below.

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 Sidney Street
CAMBRIDGE 39, MASS.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
GENTLEMEN: PLEASE SEND A COPY OF CATALOG 1006 TO:

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____


YOU CAN BE SURE.. IF IT'S
Westinghouse
NATIONAL BANK
SHOES
Westinghouse
NETWORK EQUIPMENT

When the Poles Get "Top-Heavy"..

SECONDARY NETWORKS PAY!

As you plan system improvements, examine the smaller load-density areas . . . where the load is growing *fast* . . . where demand necessitates frequent additions to distribution facilities. Then ask yourself this question:

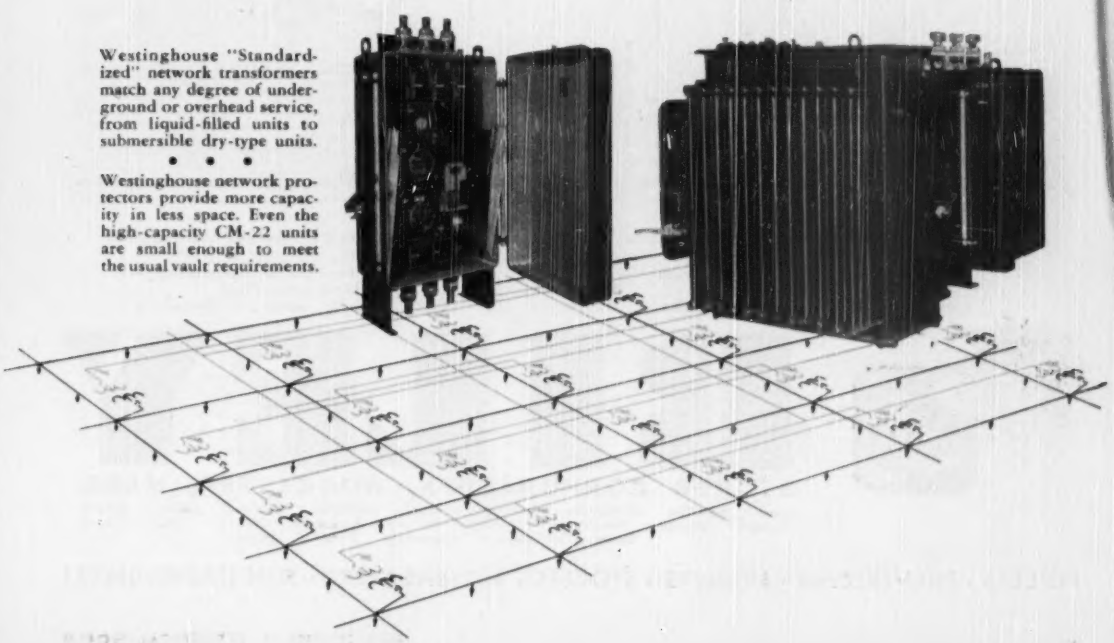
Will the maintenance of satisfactory service in these areas eventually lead to an expensive, over-congested condition . . . to "top-heavy" poles?

If the answer is "yes" . . . *it's time for a secondary network!*

The high quality of service provided by the secondary network system is just as essential to the electrical growth of the smaller commercial district as it is to the sprawling business sections of the big city. What's more, it gives you the flexibility to accommodate extensions, load shifts and future growth *economically*. It permits healthy cuts in operating and maintenance expense that add up to substantial, long-term savings . . . that spell *economy* in the final accounting.

A quarter-century ago, Westinghouse introduced the first three-phase, automatic network protector. Continuous pioneering in this field has led to such present-day developments as the first submersible, dry-type transformers. This long experience . . . our competent facilities, engineers and calculating boards . . . are available to help you with *your* network planning. Call your nearest Westinghouse office or write for Booklet B-4002, "A-C Secondary Network Systems".

Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-97145



Westinghouse "Standardized" network transformers match any degree of underground or overhead service, from liquid-filled units to submersible dry-type units.

• • •

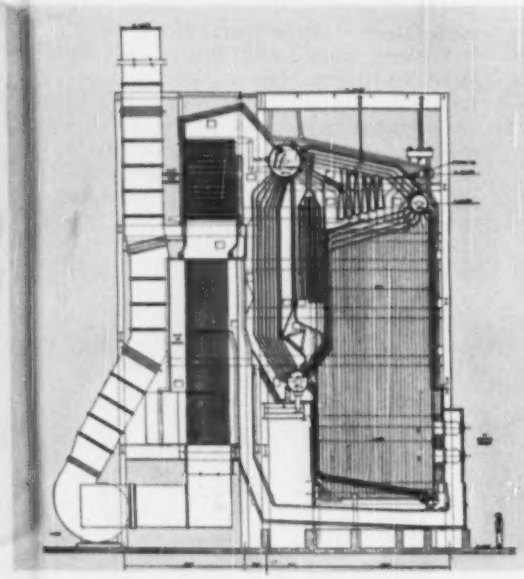
Westinghouse network protectors provide more capacity in less space. Even the high-capacity CM-22 units are small enough to meet the usual vault requirements.

All of these Public Utilities have recently ordered Riley Steam Generating Units

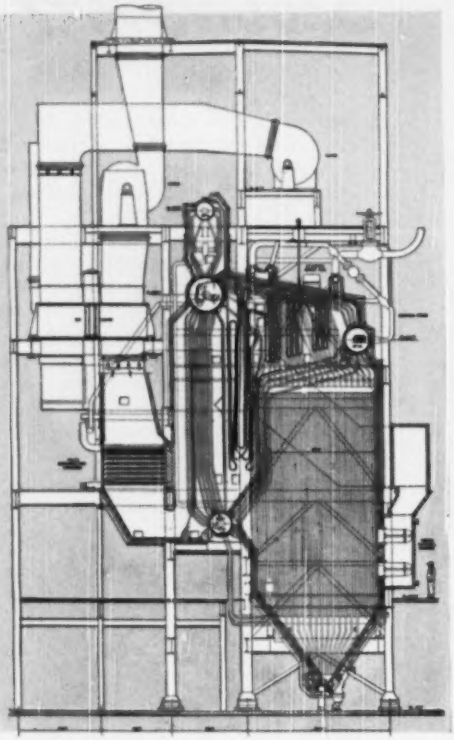
Houston Lighting & Power Co.
Public Service Co. of Indiana
Arkansas Power & Light Co.
New England Power Association
Northern Virginia Power Co.
Utah Power & Light Co.
Central Illinois Light Co.
Carolina Power & Light Co.
Union Electric Co. of Mo. & Ill.
Southwestern Public Service Co.
New Orleans Public Service Co.
Interstate Power Co.
Otter Tail Power Co.
Central Ohio Light & Power Co.
Lynn Gas & Electric Co.
Northwestern Public Service Co.
Southern Ind. Gas & Electric Co.
Pennsylvania Edison Co.
Iowa-Illinois Gas & Electric Co.
West Penn Power Co.
Ohio Edison Co.
South Carolina Power Co.
Mississippi Power Co.
Gulf Power Co.
Upper Mich. Power & Light Co.
North Dakota Power & Light Co.

The SWING in the

There is a very noticeable swing among Public Utilities to Riley Steam Generating Equipment. More and more Public Utility Companies are making their initial installation of Riley equipment and those companies who have tried Riley equipment are, almost invariably, coming back for more Riley units when expanding capacity. More than 70% of Riley's total sales during the past few years has been to public utility companies. Riley has installed or on order over 30,000,000 lbs. of steam capacity in public utility plants.



HOUSTON LIGHTING & POWER CO., Houston, Texas
850,000 lbs./hr. 1025 lbs. 905°F.
Houston Lighting & Power Company has installed or on order 9 Riley Units
4,590,000 lbs./hr. capacity of Riley Units



CITY OF LOS ANGELES—HARBOR STEAM STATION
825,000 lbs./hr. 1200 lbs. 900°F.
There are five Riley Steam Generating Units in this Plant
3,825,000 lbs./hr. capacity of Riley Units

TRADE MARK Rx REGISTERED

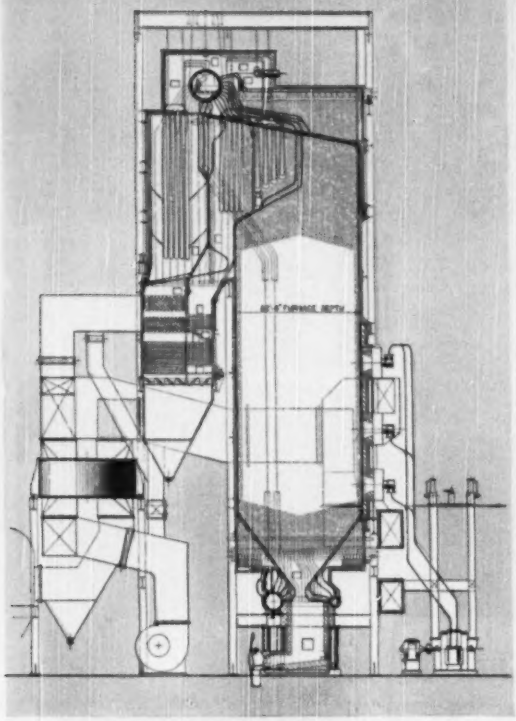
RILEY

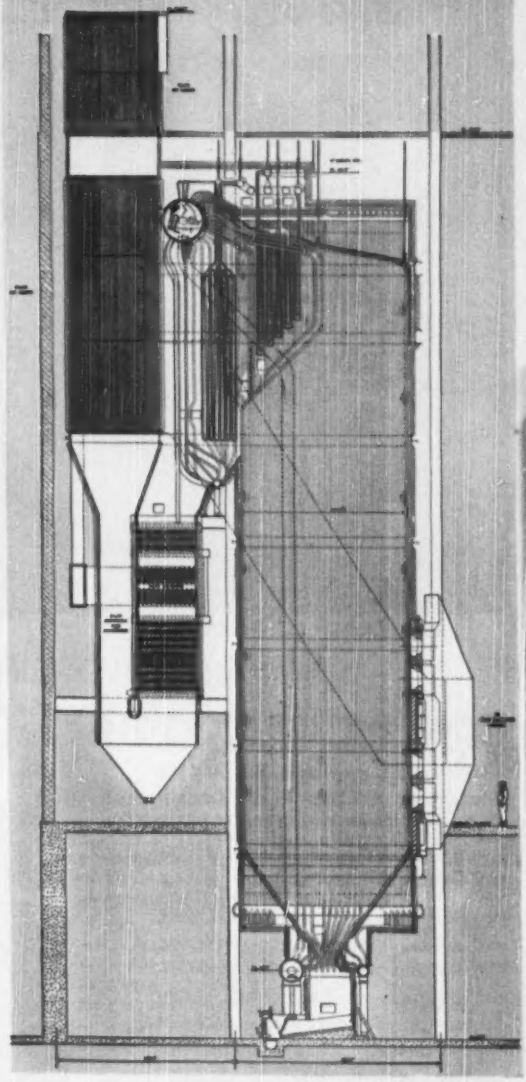
STOKER CORPORATION, WORCESTER, MASS.

Boston New York Philadelphia Washington Buffalo Pittsburgh Cleveland Detroit Chicago
Cincinnati Atlanta New Orleans Memphis St. Louis Kansas City St. Paul Tulsa Houston
Denver Salt Lake City Los Angeles Portland Seattle

BOILERS • PULVERIZERS • BURNERS • STOKERS • SUPERHEATERS • FLUE GAS SCRUBBERS

Central Station field is to RILEY





Utah Power and Light Co., Salt Lake City

620,000 lbs./hr. 1500 lbs. 955°F.
Utah Power and Light Co. is also installing
a 450,000 lbs./hr. 1050 lbs. 905°F. Riley
Steam Generating Unit fired by Riley
Pulverizers in one of their other plants
1,070,000 lbs./hr. capacity of Riley Units

Central Illinois Light Co., Peoria, Ill.

600,000 lbs./hr. 950 lbs. 900°F.
There are four additional Riley
Steam Generating Units in this plant
1,875,000 lbs./hr. capacity of Riley Units

A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your [illegible] costs

COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

ECONOMIZERS • WATER-COOLED FURNACES • STEEL-CLAD [illegible] • AIR HEATERS

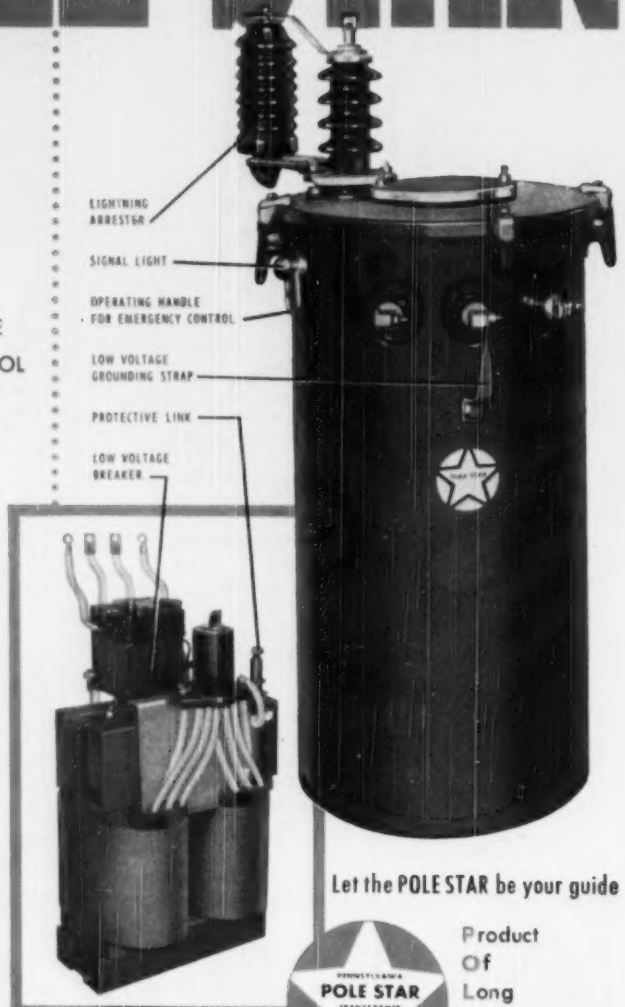
THERE ARE MANY PROTECTED POLE TYPE TRANSFORMERS

but only **ONE PROTECTED**

POLE STAR

TYPE CSP Equipped with

- LIGHTNING ARRESTERS
- PROTECTIVE LINK
- LOW VOLTAGE BREAKER
- SIGNAL LIGHT AND BREAKER OPERATING HANDLE
- EMERGENCY BREAKER CONTROL
- GROUND DISCHARGE GAP or GROUND CONNECTOR



MANY distribution transformers are equipped with safety devices for maximum electrical protection. But only the Transformer manufactured by Pennsylvania gives you this protection PLUS the many decided advantages of Pole Star design and construction.

IN THE POLE STAR, Pennsylvania gives you a small, light, efficient transformer. The exclusive *Pennsylvania-Developed* and *Pennsylvania-Engineered* design gives you a transformer with an inherent low exciting current and a core that can easily be disassembled and rebuilt without appreciably affecting the original core loss or exciting current. And, the POLE STAR gives you added protection with its Sealed Tank construction and retained synthetic rubber gaskets.

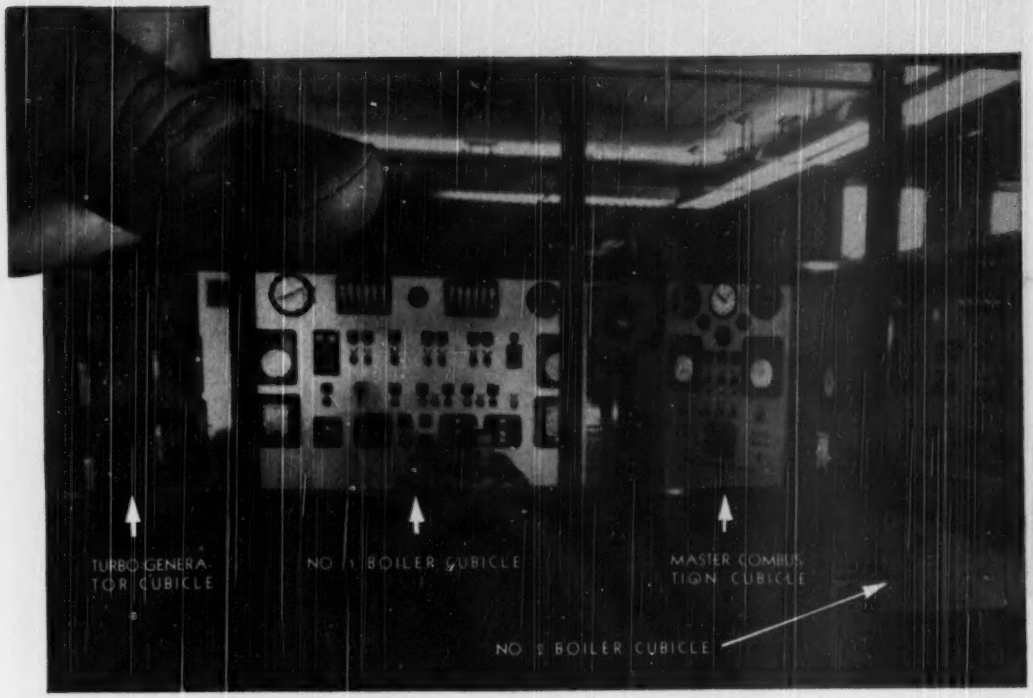
Let the POLE STAR be your guide

Product Of Long Experience

Safe Thrifty And Reliable

Pennsylvania **TRANSFORMER COMPANY**

CANONSBURG, PENNA. *Greater Pittsburgh District*



THESE L&N-BUILT CUBICLES PUT STATION OPERATION "UNDER ONE THUMB"

Control-wise, the outstanding feature of Warren Station of Pennsylvania Electric Co. is that it demonstrates the coordinated, "under one thumb" regulation of boiler, turbine and generator. A single operator, stationed in a central control room, has undivided responsibility for every step, from putting coal into the furnace at one "end" of the plant to turning out kilowatts at the other "end". Gone are telephone conversations between boiler room and electric control room operators—gone is divided responsibility.

PENELEC engineers secured the control equipment for this efficient operation in a highly efficient way. They turned over the whole job of designing control cubicles to Leeds & Northrup specialists. We can handle this work effectively, because we make key instruments for so many processes—Metermax Combustion Control; Micromax Superheat Control; Micromax Recorders for temperature, CO_2, conductivity and other conditions.

Drawing on our years of experience in power instrument layout, we proceeded to design PENELEC's cubicles from the ground up to meet their particular needs. Instruments and controllers, switches, stop-start stations, signals and alarms were arranged for correct sequential operation. Each cubicle was detailed on complete drawings showing steel work, internal piping and actual final wiring.

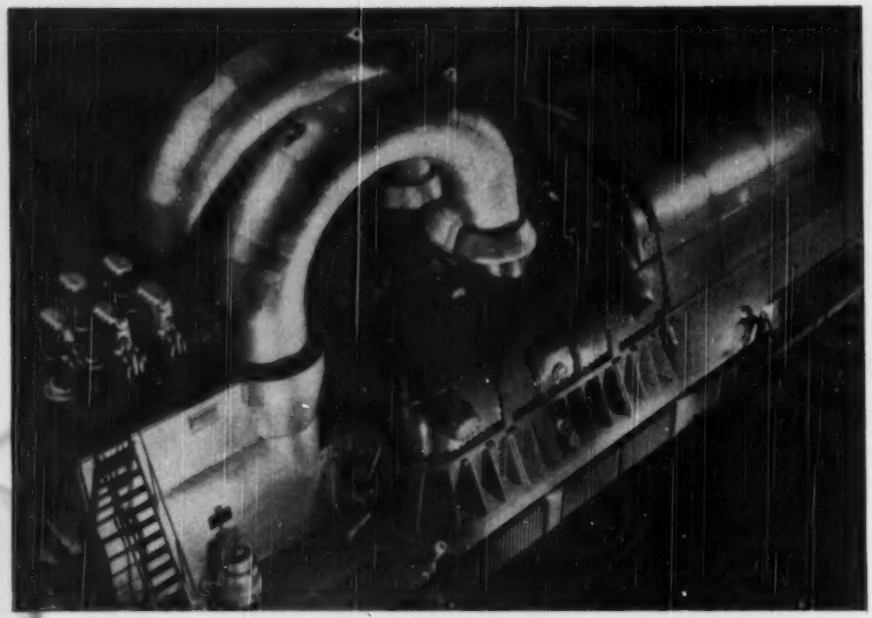
Before leaving the L&N plant, each cubicle was completely assembled and then tested as a unit. When the equipment reached Warren, every connection to every instrument, controller, switch and signal was in place. To be ready for use, the group of cubicles needed only to be set in position and connected to electric control drives, primary elements and station power supply. The user saved much time, trouble and expense for his own engineering staff, and has the advantages of an entirely factory-assembled cubicle.

We'll be glad to send information about L&N instruments, controllers, and panels or cubicles. Write to Leeds & Northrup Company, 4938 Stenton Avenue, Philadelphia 44, Pennsylvania.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl Ad N-460(2)



Why Philadelphia Electric Company

PROTECTS ITS TURBINES *by CENTRIFUGAL FORCE*

This great power company uses De Laval centrifuges to purify the lubricating oil used in three different classes of turbines:

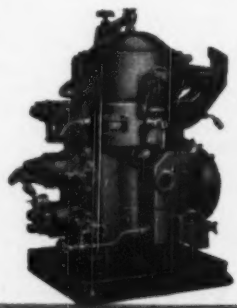
(1) Large turbines, with moderate steam pressure and temperature, and large volume of oil in the system

(2) Low pressure, low temperature turbine of moderate size with relatively small volume of oil in the system

(3) Topping turbine: high pressure, high temperature; larger quantity of lubricating oil

The De Laval machines remove the particles of dirt which may be picked up from the system ***and*** they remove any moisture that may be in the oil. Where inhibited oils are used, the centrifuge purifies the oil without removing the additives — an important advantage of centrifugal force.

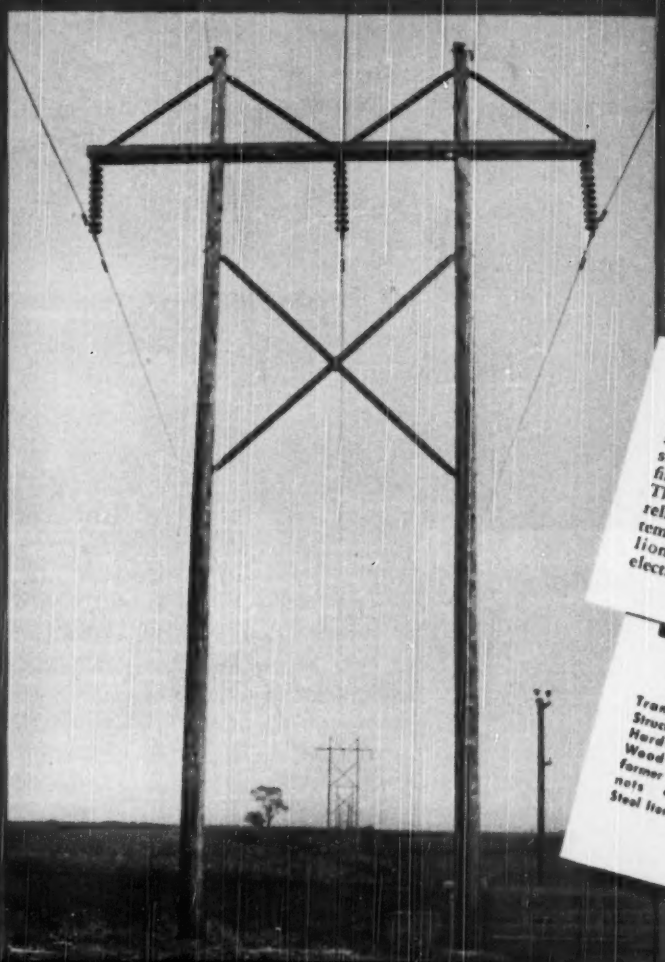
In a word, De Laval centrifugal machines offer complete protection to all classes of turbines!



THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL
LUBRICATING OIL PURIFIERS

Hughes DEPENDABLE X-BRACED TRANSMISSION STRUCTURES



HUGHES BROTHERS developed and pioneered "X-Braced" construction, worked out the structural theory, and confirmed it by full-sized tests. The results: Thoroughly reliable transmission systems, and savings of millions of dollars for the electric utility industry.

Manufacturers of

Transmission and Distribution Structures • Transmission Line Hardware • Prefabricated Wood Substations • Transformer Platforms • Wood Beyenots • Special Wood and Steel Items.

☆

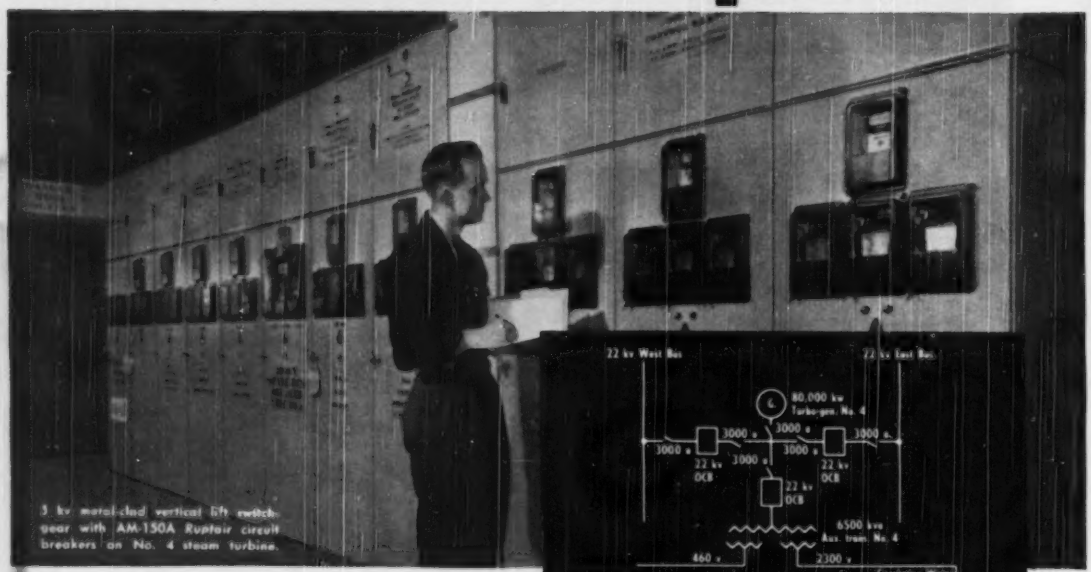
WHEN IT'S HUGHES *It's Tailored* TO YOUR NEEDS

HUGHES BROTHERS SEWARD NEBRASKA

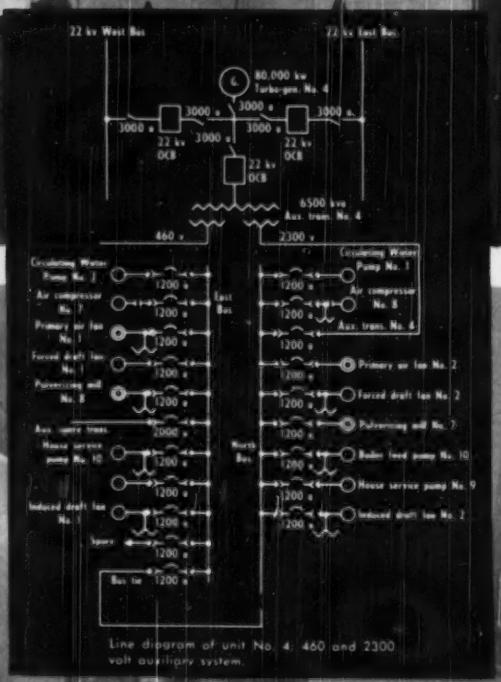
FOUNDED - 1921 INCORPORATED

HUGHES TRANSMISSION & DISTRIBUTION MATERIAL MEN'S

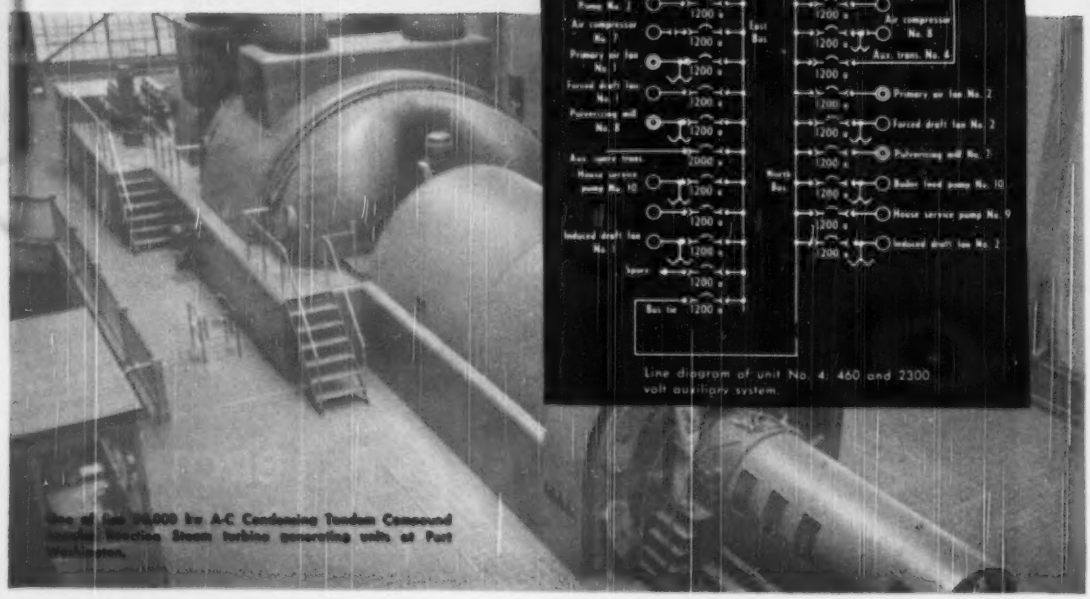
ALLIS-CHALMERS Power Output at



3 kv metal-clad vertical lift switchgear with AM-150A Ruptair circuit breakers on No. 4 steam turbine.



Line diagram of unit No. 4, 460 and 2300 volt auxiliary system.



One of two 66,000 kw A-C Condensing Tandem Compound double-flow Steam Turbine generating units at Port Washington.

Switchgear Protects Port Washington

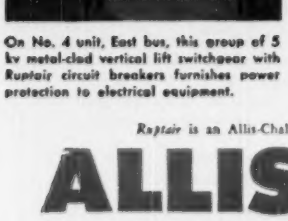
Many of today's accepted ideas in steam power production — pulverized coal firing, mill drying, single boiler design, and radiant superheating — were developed by the Wisconsin Electric Power Co. and applied in their efficient Port Washington, Wis., plant.

The engineers responsible for design and planning of this plant selected Allis-Chalmers Air Blast and *Ruptair* 5 kv high voltage switchgear to protect valuable auxiliary equipment at their 320,000 kw plant.

TWO DECADES of pioneering in power stand behind the Port Washington steam power plant that serves Milwaukee's metropolitan area . . . and today it is one of the world's most efficient and modern.

Allis-Chalmers high voltage switchgear protects boiler feed and circulating pumps, induced and forced draft fans, mill motors and air compressors on turbo-generator units number 2 and 4.

Throughout the Port Washington plant you'll find the latest in electrical design. Generated voltage is 22,000 volts. All 22 kv buses and equipment are protected by a fault bus system that instantaneously clears faults before they develop into phase-to-phase short circuits. The bulk of the load is delivered to the 132 kv system through banks of three 30,000 kva single phase transformers. Practically all stationary auxiliary equipment is electrically driven.



On No. 4 unit, East bus, this group of 5 kv metal-clad vertical lift switchgear with Ruptair circuit breakers furnishes power protection to electrical equipment.

Allis-Chalmers switchgear equipment includes 5 kv metal-clad vertical lift switchgear with 600, 1200, and 2000 ampere *Ruptair* breakers on unit #4 and 5 kv metal-clad switchgear with AB 7.5/150 Air Blast circuit breakers on unit #2. FZ-220 oil circuit breakers rated 22 kv protect output on all generators and all step-up transformers. Allis-Chalmers transformers step up 22,000 volts to 132,000 volts transmission line voltage

Three OISC 30,000 kva. 132,000/22000 volt transformers on No. 1 turbine unit.

* * *

It is plain good business to specify Allis-Chalmers switchgear for control and protection of electrical equipment. Standardized, steel-enclosed Allis-Chalmers switchgear can be installed quickly — because it is prefabricated and ready to operate when delivered. Mechanically operated trip-free breakers give low cost reliable operation.

Ruptair circuit breakers incorporate Elkonite faced contacts to insure long life and trouble free repetitive duty. The switchgear is constructed and designed for safety of operation. Sound engineering is reflected throughout each unit.

For more information, call or write your A-C sales office.

ALLIS-CHALMERS, 932A SO. 70 ST. A-2934
MILWAUKEE, WIS.

Ruptair is an Allis-Chalmers trademark

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

Corridors can be beautiful, too

Joliet Township High School
J. E. Coyle, Architect
Harry Norris, Contractor

COR-180

the Leader CORRI-Lite *transforms long, dim halls into bright, cheerful areas*

LEADER DIRECTIONAL INCANDESCENT LIGHT
Cat. No. RA-765

For stairwells and other critical areas. Durable, quality fixtures, with directional lens. Easy to service. Available in various wattages up to 300.

Corridors . . . no matter how well designed and appointed . . . are apt to be gloomy, tired-looking affairs. Install LEADER CORRI-Lites, and even the plainest passageways instantly become invitingly bright and cheerful! The CORRI-Lite . . . with its graceful design of baffles . . . is equally helpful in lending a lively lift to other narrow sites . . . narrow rooms, offices, stores.

SPECIFICATIONS

CORRI-Lite can be furnished for use with regular 40-watt fluorescent tubes or for use with 60", 72" and 96" Slimline tubes. Installation may be made with individual units, or in a continuous row, as pictured above. Baffles add to beauty of this fixture and give correct shielding. Made of 20 gauge steel. Completely wired and ready for installation . . . *Get complete specifications.*

Sold and installed only by the better electrical wholesalers and contractors

LEADER ELECTRIC COMPANY

3500 North Kedzie Avenue • Chicago 18, Illinois
Leader Electric Western—800 One Hundredth Avenue, Oakland 3, Cal.

HERE'S WHY YOU GET LONGER LIFE WITH GOULD PLANTÉ

Planté positive plates are pure lead. They contain no antimonial impurities to contaminate the negative plates. That is the reason Gould Planté is universally accepted as the forerunner of Stationary Batteries.

PURE LEAD MEANS SERVICE

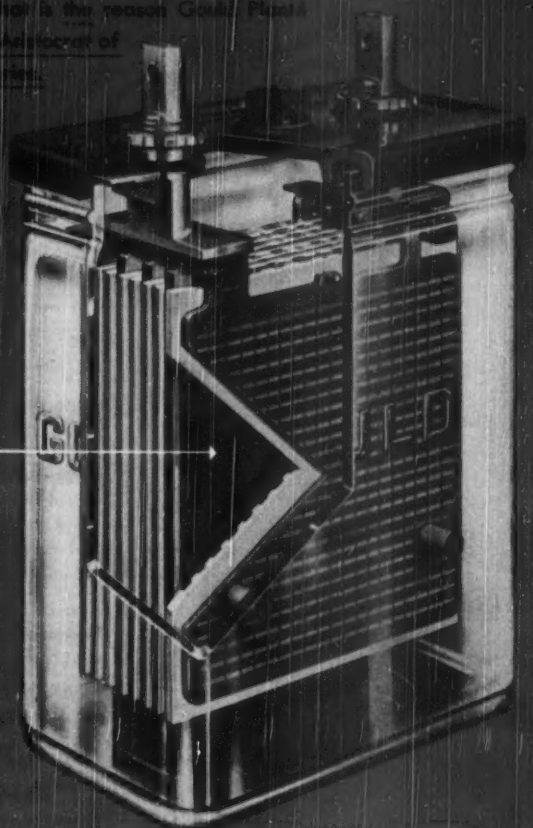
Batteries on full float service require a small current to offset normal self-discharge. This self-discharge is due primarily to migration of antimonial impurities from the positive grids or grid frames to the negative plates. As the self-discharge rate increases, more and more antimony is transferred to the negative plates. This cycle is repeated with increasing speed until the positive grid fails completely.

Gould Planté batteries contain no antimonial impurities. Their voltage requirements and capacity remain constant throughout their unusually long, low-cost life.

GOULD'S COMPLETE LINE

Other Gould types—Rail, Edisonia and Dreadnaught—are designed to meet the diverse capital expenditure, cost, service, and capacity requirements of switchgear, alarm systems, emergency light and power, or telephone battery users.

The Gould "Battery Selector," GB-852, gives full information. Write for your copy, now.

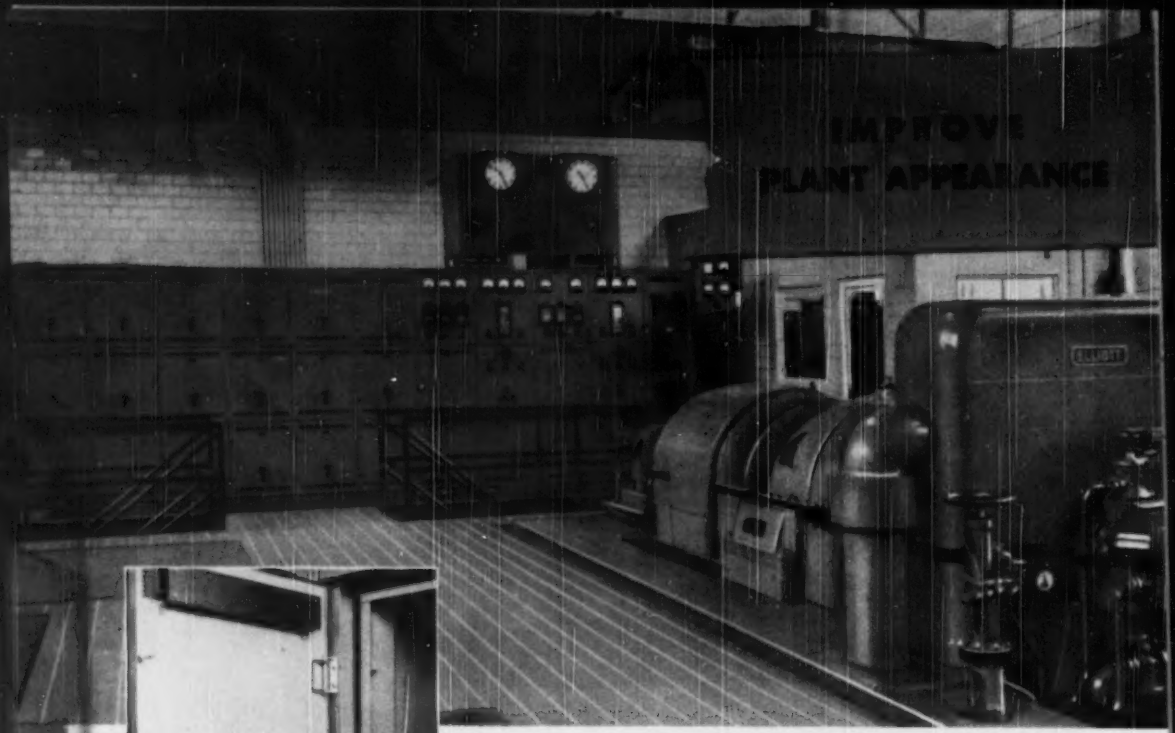


GOULD

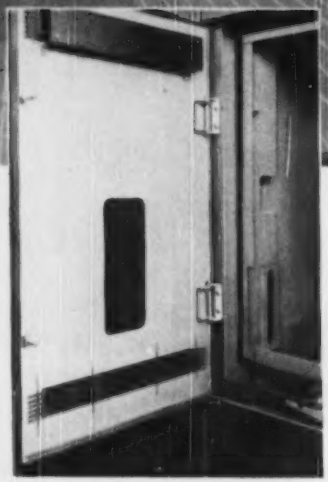
STORAGE BATTERY CORPORATION

TRENTON 7, NEW JERSEY

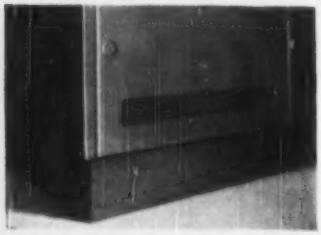
Always Use Gould Automobile and Truck Batteries



Photograph — Courtesy Falls City Brewing Co., Louisville, Ky.



All panels and doors are full-formed sheet steel. Corners are turned and welded for greater rigidity. All hinges are concealed by being mounted *inside* the enclosure. Effective grilled louvers contribute to the smooth, neat appearance of the switchboard.



Practical and attractive sturdy channel base can be bolted to the floor, or it can be inset either part-way or flush with the floor surface. Formed top trim and end panels complete the elimination of dangerous and unsightly raw metal edges.

MULTUMITE SWITCHGEAR IS ATTRACTIVE!

Note the compactness and beauty in the construction of the typical Multumite assembly above. With the exception of the breaker-operating handles and the semi-flush instruments, the exterior of the board presents a flat surface from top to base. All parts of the enclosure are full-formed from sheet steel—there are no raw metal edges. Grilled louvers and easy-to-adjust door hinges are hidden inside, adding to the pleasing appearance of the board.

The exterior finish of Multumite switchgear is an oven-baked synthetic enamel—bonderized to the metal to guarantee a permanently attractive surface.

GET THESE DESCRIPTIVE BULLETINS:

6003-D A complete reference guide to I-T-E 600 V Switchgear assemblies. Contains dimension information on I-T-E Multumite, and helpful facts for specifying and ordering complete switchgear installations.

7000-A Describes I-T-E's newest 5 KV Switchgear—is illustrated and supplemented with practical, easy-to-read drawings and diagrams. If you have any questions on modern HV switchgear construction, it will pay you to have this bulletin.

Get both bulletins—ask your local I-T-E Representative, or write I-T-E General Offices.

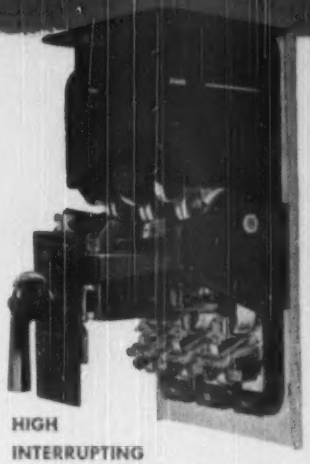
get Extra Protection— SPECIFY I·T·E MULTUMITE SWITCHGEAR!

I-T-E Multumite Switchgear is specially designed to provide the *extra margin of safety* so necessary to uninterrupted service of electrical circuits. Metal-enclosed Multumite Switchgear assures positive protection of secondary distribution systems. *Here are some reasons why:*

1. Breaker's metal panel separates bus and breaker compartment, seals off ionized gases.
2. Silver-plated buses and connections eliminate progressive oxidization, minimize temperature rise.
3. Easy accessibility of breakers and bus compartments facilitates inspection and maintenance.
4. Enclosure of control wiring in metal troughs provides a new degree of safety and protection.
5. Specially designed arc chutes quench arcs *quickly* and dependably, *in air.*
6. Breakers are mechanically and electrically trip-free.

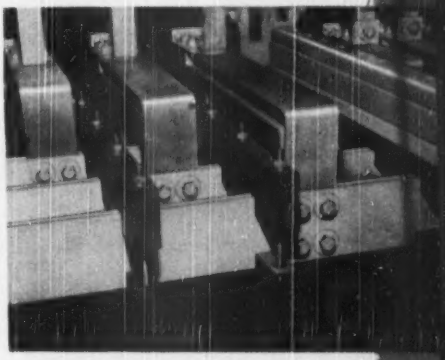
These examples of extra quality—extra protection built into I-T-E Switchgear are typical. Investigate the others.

All I-T-E Switchgear assemblies offer the benefits of an application planned for your specific needs, with units coordinated for most effective protection. Quick, easy installation is assured. *Complete* assembly is tested *before* shipment. Quality is fully guaranteed.



HIGH INTERRUPTING CAPACITY BREAKERS

TYPE KB Breaker. 25,000 RMS Amp. Interrupting Rating. 600 Amp. Continuous Rating. 2, 3, or 4 Poles. Manually or electrically operated.



IDEAL BUS ARRANGEMENT

MULTUMITE BUS is arranged for adequate electrical clearance. Strong bracing with sturdy insulating supports assures withstanding maximum short circuit stresses. Bolted connections provide solid contact and rigidity.

For *more dependable* Switchgear

specify I-T-E!

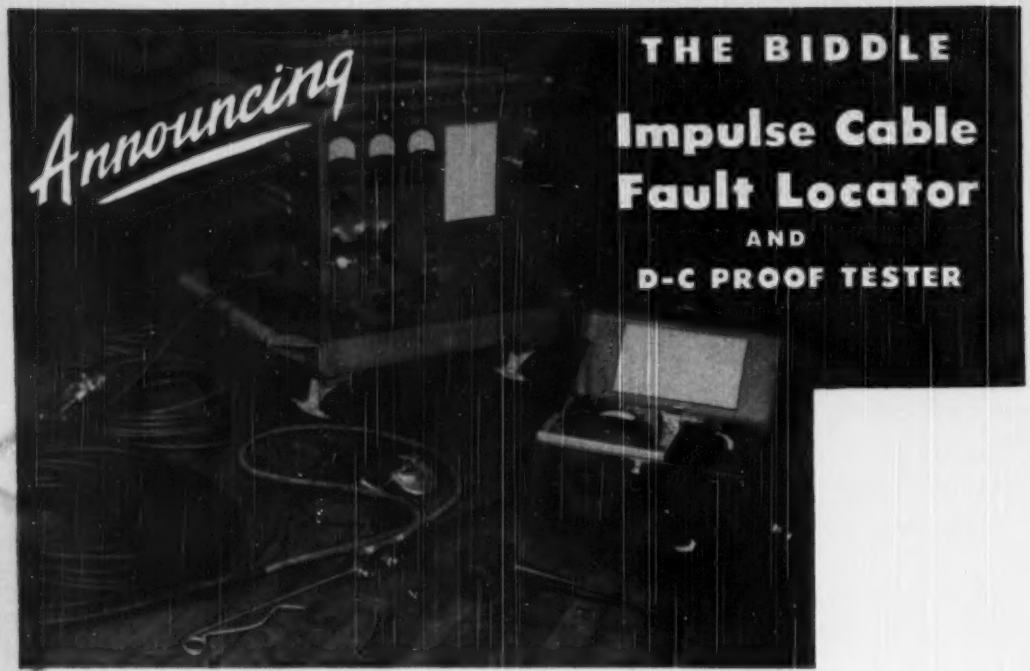
R&IE

I-T-E Circuit Breaker Company • 19th & Hamilton Streets • Philadelphia 30, Pa.

Power Switching Equipment: Railway and Industrial Engineering Co., Greensburg, Pa.

Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., New York

SWITCHGEAR • UNIT SUBSTATIONS • ISOLATED PHASE BUS STRUCTURES • CIRCUIT BREAKERS • MECHANICAL RECTIFIERS RESISTORS • SPECIAL PRODUCTS



—A High Voltage D-C Impulse Transmitter with Pickup Coil and Pointer-Indicating Detector

The Model 2-2 Fault Locator, here illustrated, is rated up to 20 kv. with a discharge capacitance of 2.5 muf. It is for use on all cable up to 15 kv. and higher. Requires only about 500 watts to operate, from a 115-volt lighting circuit. The transmitter can be used independently as a source of high voltage D-C for proof testing on all types of electrical equipment.

Designed primarily for locating faults on lead-covered cable installed in ducts, this *NEW* equipment has applications also on aerial and buried cable, and has proved highly effective in utility and industrial service. In operation, the set is essentially independent of the type of fault or its apparent resistance, and depends only on the impulse voltage required to break down the fault.

The BIDDLE Impulse Cable Fault Locator was developed on the property of a large eastern utility company and therefore incorporates the experience and resourcefulness of engineers who have learned by "the hard way" that there is no "magic" in locating cable faults.

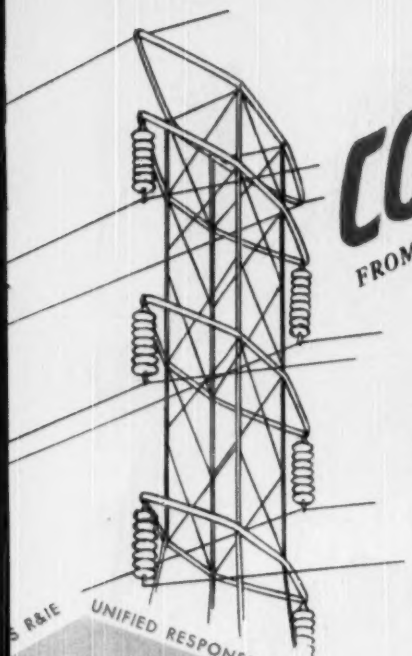
This cable fault locator is definitely *not* another *magic box!* We shall gladly refer you to users of this equipment, whose experience should be helpful if you have cable fault locating problems.

Please write for Bulletin 65-W giving full particulars.

JAMES G. BIDDLE CO.
Electrical & Scientific Instruments
1316 ARCH STREET, PHILADELPHIA 7, PA.

"Megger"® INSULATION TESTERS • GROUND TESTERS • OHMMETERS

SUBSTATION AND SWITCHING PROBLEMS



COVERED!

FROM THE LAYOUT TO THE LINE

when you rely on

R&IE

UNIFIED RESPONSIBILITY

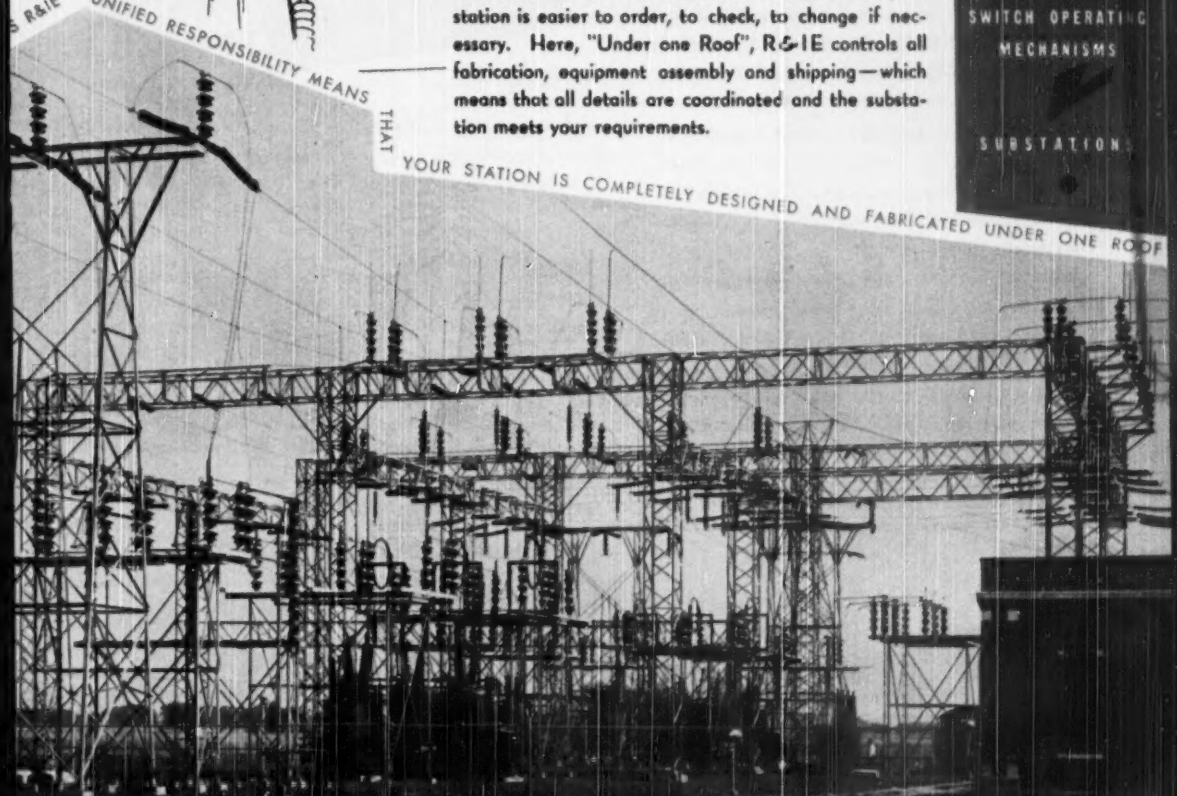
FROM THE LAYOUT TO THE LINE—Substation design and detail arrangements such as shown here are everyday problems with R&IE engineers. For over thirty years R&IE has set the standard in the solution of simple or complex layout requirements.

R&IE UNIFIED RESPONSIBILITY means that your station is easier to order, to check, to change if necessary. Here, "Under one Roof", R&IE controls all fabrication, equipment assembly and shipping—which means that all details are coordinated and the substation meets your requirements.

The Short List

- CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS
- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- DISTRIBUTION EQUIPMENT
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS

R&IE UNIFIED RESPONSIBILITY MEANS THAT YOUR STATION IS COMPLETELY DESIGNED AND FABRICATED UNDER ONE ROOF



RAILWAY and INDUSTRIAL ENGINEERING CO., GREENSBURG, PA.

AFFILIATED WITH THE I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

IN CANADA - EASTERN POWER DEVICES LIMITED, TORONTO

It's no trick

TO CUT REPLACEMENT COSTS WITH U·S·S CREOSOTE OIL

● There's no magic about the savings made possible by treatment with U·S·S Creosote Oil. Poles and crossarms that have been treated with this time-tested preservative last years longer . . . require far fewer replacements than untreated poles.

The adequate penetration and high toxicity that spell long life are characteristic of U·S·S Creosote Oil. And continuous processing in the world's largest tar distillation plant makes U·S·S Creosote Oil absolutely uniform in quality . . . the same good results can be obtained application after application.

If you're interested in cutting replacement costs in future years, make sure that U·S·S Creosote Oil is used in all your wood-treating operations. If you'd like additional information, contact the nearest sales office listed below; there's no obligation.

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CREOSOTE OIL

UNITED STATES STEEL

YOU CAN BE SURE.. IF IT'S
Westinghouse

IT TAKES SEPARATE UNIT CONSTRUCTION FOR *Fast Meter Assembly* *

Meters made like this save money. Take one apart. See how it's made. Compare.

Notice how the Westinghouse meter practically assembles itself. There's no adjusting or fitting. The elements are *made* to fit together. That comes from precision manufacture.

And when you reassemble the meter . . . *every unit retains perfect calibration.* Every unit can be replaced in the field. All you need is a few minutes and a screw driver.

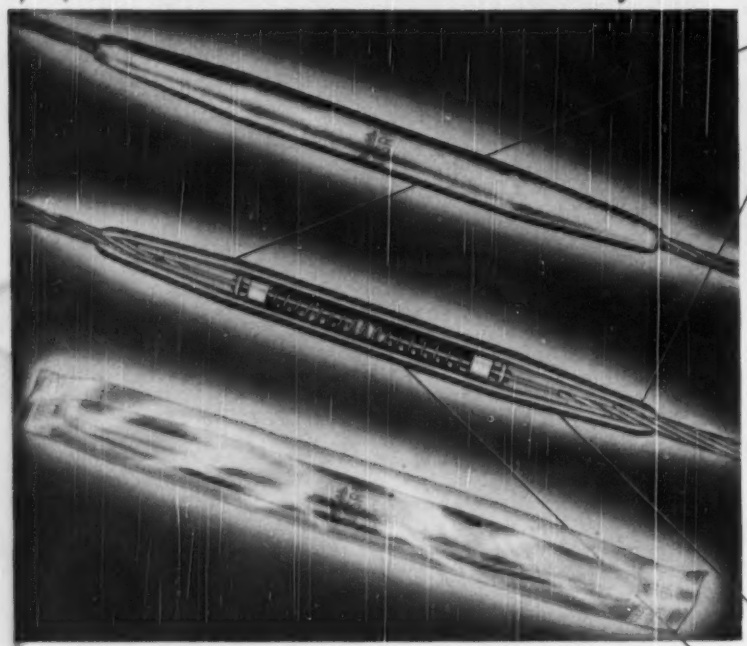
That's the story. Meters so perfectly made . . . so dependable their accuracy holds for years and years . . . without bearing replacement . . . even without attention. Your own service records will prove it!

Want more proof? Call your nearest Westinghouse office or write for the new booklet, B-4665, "What It Takes for Long-time, Low-cost Metering." Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-40371

A VITAL PART OF LONG-TIME, LOW-COST METERING

Westinghouse METERS

Accents on Accuracy



in the manufacture of

THE NEW, TOUGH, DEPENDABLE

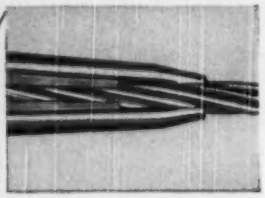
ACSR STRAIGHTLINE SPLICE

FAST, POSITIVE ASSEMBLY • NO TOOLS NEEDED FOR INSTALLATION ON ACSR CONDUCTOR • DEVELOPS RATED TENSILE STRENGTH • HARDENED STEEL-GRIP TEETH • TENSION-SET JAWS

Reliable sizes 1/2 and 4/4 ACSR Straightline splices are now available from stock. In both sizes there are types to provide for 7/1 and 6/1 strand. Outer tube of hardened aluminum alloy. Fast assembly to steel core and conductor: core is bared 3" to 3¼"; jaw permits passage of core wire beyond point where jaws engage aluminum strand, assuring proper positioning for full core-gripping area of jaws. Strand will not enter splice until core wire is properly positioned. Jaws are set on core and strand by applied tension. Splices are packed with corrosion- and weather-resisting neutral grease and enclosed in individual double cellophane envelopes. Plain instructions for proper use are enclosed with each splice.

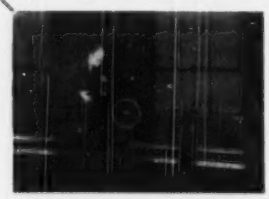
Splice is provided with release slots.

1. 648 Zinolyte plated steel teeth grip the wire firmly, but without gashing. Strand fits to jaw shoulder, assuring proper positioning.



2. Tube ends are accurately designed to prevent insertion of burred or misshapen wires. Design guides strands to their proper position.

3. Rigid tensile tests of ACSR and splice assembly reveal holding strength in excess of rated tensile of ACSR.



4. Vibration tests check dependability under various degrees of tension.

Conclusive test data available on request.

Reliable ELECTRIC COMPANY

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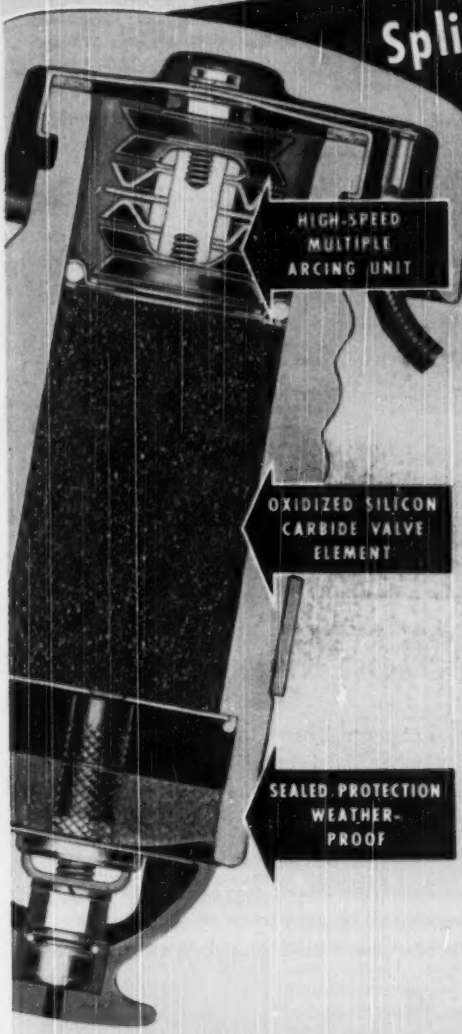
OVER 40 YEARS OF SERVICE TO THE UTILITIES

POWER-LINE CONNECTORS
AND
CONSTRUCTION SPECIALTIES

Split Second Protection
High Surge Discharge
Long Life!



Low Voltage Drop—Extremely Marked Valve Action . . .

Speed and superior valve action of Crystal Valves have set a high standard of lightning protection for the world's power lines.

Crystal Valves stand guard over equipment and service at all times. Their weatherproof construction withstands the heat of summer . . . the cold of winter, thus assuring long life split second protection. Crystal Valve research offers:

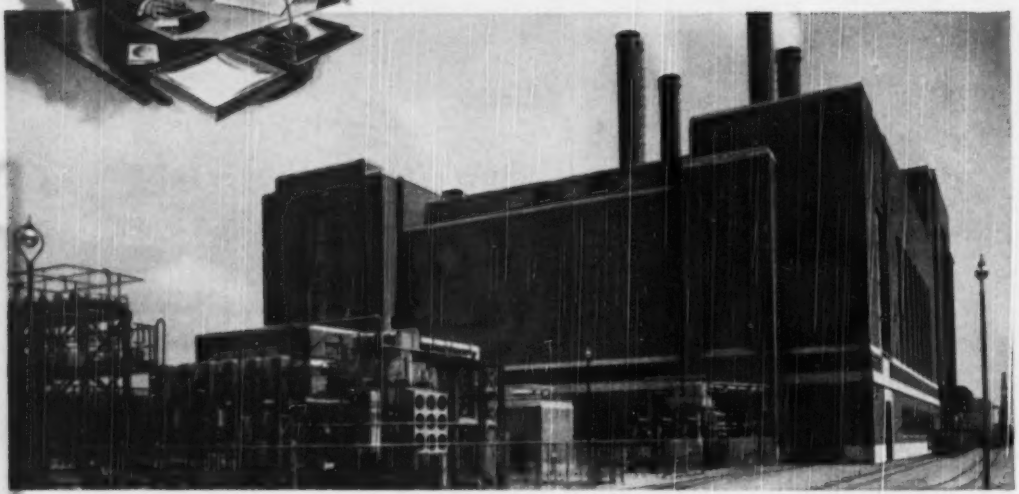
- Gasketed copper sealing cover.
- Line lead moisture shield.
- High-speed multi-gap structure.
- Accurately ground Steatite spacers.
- Oxidized Silicon Carbide Valve Element.
- Wet process porcelain body and cap.
- Drip petticoats on cap and body.

Get the latest technical data on lightning arrestors and their installation. Let us put your name on the list to receive a series of informative technical booklets. No obligation.

ELECTRIC SERVICE MANUFACTURING CO. • 1709 Cambria St. • Philadelphia 32, Penna.

CRYSTAL VALVE
LIGHTNING ARRESTERS

"My bet's on Bituminous-



—the kind that is mined on the B&O!"

Take a tip from executives who think in terms of fuel economy and dependability of supply. These men design their plants for the efficient coals mined in B&O territory.

These coals, available in wide variety for all needs, lend themselves to mechanized, low-cost mining. As they are located close to America's industrial heart, transportation costs are moderate. And because their sources are *known* and *definite*, they can be depended upon —*even during wartime*— for centuries to come.

Backing its faith in Bituminous, the B&O has made large capital investments in its properties. The result will be even more efficient service for the Bituminous industry and its customers.

Ask Our Man!

BITUMINOUS COALS FOR EVERY PURPOSE

from modern mines like this—→

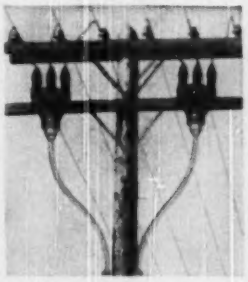
BALTIMORE & OHIO RAILROAD

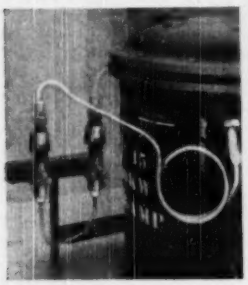
Constantly *doing things* **—better!**

Secure 'PRIMARY' CABLE SYSTEM 'F-L-E-X-I-B-I-L-I-T-Y with G & W sectionalizing devices

DISCONNECTING POTHEADS

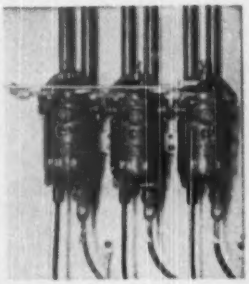
In addition to protecting the cable ends, G&W Type "ES" potheads provide a convenient and economical means for disconnecting cables from overhead wires. They are non-load break and ordinarily limited to operating voltages up to 7500. They are applied to cable systems, where installation conditions permit, as an inexpensive means for sectionalizing cables; for disconnecting branches from through runs and for isolating transformers. Single phase branch loads can be balanced on a three phase main by shifting the interchangeable plug caps. The gang operating feature has increased their usefulness as a three phase cable end disconnect.

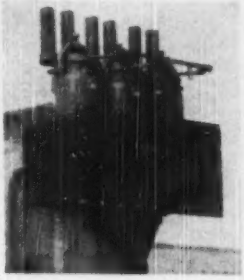




OIL FUSE CUTOUTS

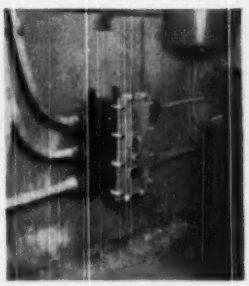
G&W Type "FC" oil fuse cutouts are used for fusing and switching of primary circuits in subway, vault and overhead installations. The gang operating mechanism provides for load break three phase sectionalizing. The fuse gives overload and short circuit protection. Within the limits of their short circuit interrupting capacity, oil fuse cutouts often can be applied to locations which do not require the more expensive oil circuit breakers. The heavy all steel housing confines the fuse arc, providing safety from fire. The sealed construction is submersion proof. Cutouts are used as separate units for single conductor cables or mounted on welded steel boxes which enclose connections to multiple conductor cables.

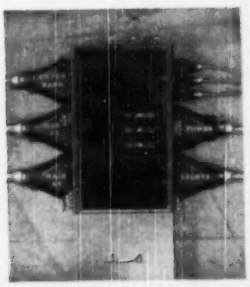




CABLE BOXES

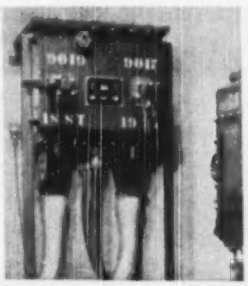
Disconnecting link subway cable boxes were an early development for sectionalizing underground cables in the same way that pole top disconnects are used on overhead systems. There are two general classes of high voltage link boxes—AIR FILLED for voltages up to 7500 and OIL FILLED for higher voltages. Time is required to operate the links in subway cable boxes because the circuits must be de-energized, the gasketed cover removed, the links individually removed or inserted and the cover replaced. Boxes should be tested for air and water tightness after each time they have been opened. The use of cable boxes may be justified by economic considerations when the frequency and the time required for operation of links is not an important factor.





OIL SWITCHES

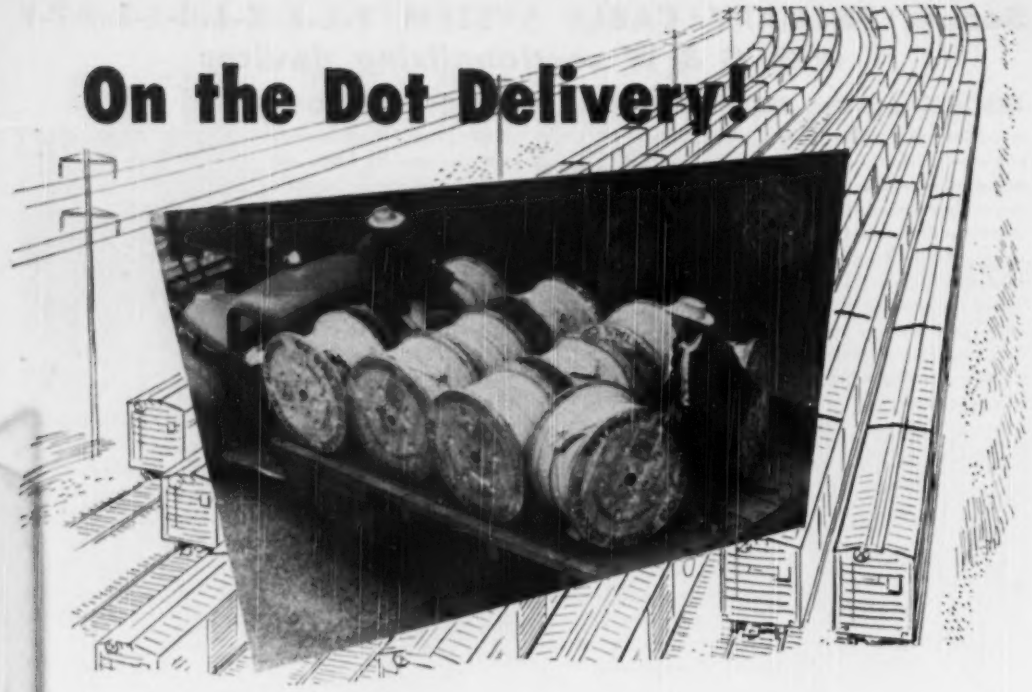
For safe, speedy sectionalization of cable circuits install load break subway oil switches. In case of trouble, sections of cable can be quickly isolated and circuits can be rerouted to restore service in the area affected. Load break disconnection is accomplished by manual (or automatic) operation of an external lever—without opening the tank or breaking the seal. Separate unit single throw oil switches are preferred by some operators. On the other hand, G&W Type "RA" multiple circuit oil switches combining standardized unit parts are solving many sectionalizing problems. Their simple sturdy design requires minimum maintenance. There is a definite trend toward their use because they save space and provide system flexibility in a simple and economical manner.



Send for your copy of new bulletin No. H49, a treatise on "Primary Cable System Flexibility."

G & W ELECTRIC SPECIALTY CO., 7780 DANTE AVENUE, CHICAGO 19, ILLINOIS, U. S. A.

On the Dot Delivery!



Every order for Reynolds ACSR has been delivered on or before the promised date

FROM the day Reynolds entered the cable business, it geared itself to meet the exacting needs of your business. Firm delivery dates were promised as a part of Reynolds complete cable service. That promise has been kept 100%! In over a year, not one single order has fallen behind the promised delivery date.

When you specify Reynolds ACSR you are not only assured of dependable supply but important economies, too. First cost of aluminum conductor is considerably lower than copper and its light weight makes for further savings on the job through (1) easier, faster stringing and (2) use of greater spans without increase in sag.

For prices and complete product information, call the Reynolds field office listed under "Aluminum" in your classified telephone directory.

SAVE TIME • SAVE MONEY WITH PREFORMED ALUMINUM ARMOR RODS

Preformed aluminum armor rods are recommended for use with Reynolds ACSR. There are no magnetic power losses or corrosion problems. Especially on the smaller sizes, preformed aluminum rods have proved easier and more economical to install . . . eliminate the need for clips, clamps and special tools.

Through research, Reynolds has determined the most suitable, strong aluminum alloy for this service. For complete information, write to Reynolds Metals Company, Louisville 1, Kentucky.

REYNOLDS METALS

REYNOLDS *Lifetime* ALUMINUM

CONSIDER ALUMINUM • CONSULT REYNOLDS • THE COMPLETE ALUMINUM SERVICE

Hytool—MB2

Hypress—Y34-A

Up goes the bucket with Hysplices and Hypress. Quickly, the 9-ton indenting force of the Hypress permanently joins conductor and Hysplice sleeve. The line is up...sure and secure wherever it has been Hyspliced!

For every overhead conductor and for every size, there's a Burndy Hysplice sleeve. Regardless of the installation, there is a Burndy tool for the job—manual, hydraulic or electrically-driven. Each one most efficient for the job it was designed to do.

Connect with

BURNDY NEW YORK 54, N. Y.

Want to know about Hysplices for Copper, ACSR and other conductors? How about performance. Why do Burndy Hytools and Hypresses simplify splicing? 20-page HYSPLICE CATALOG gives you the answer. Write Burndy for your copy.

when you need

GOOD INSULATION

. . . to make your product sell and serve, you have only two choices so far as mica goes . . . ordinary mica, and MACALLEN MICA. And—because it is easy and economical to say MACALLEN, and hard and expensive to right the engineering wrongs that poor mica brings, you'll find that most canny production and purchasing men are forgetting that there's such a thing as plain, everyday mica. Just check on those electrical products that lead the reputation parade. You'll find that they are MACALLEN MICA insulated—one good name helping another.

PRECISION . . .

Many engineers never connect precision with mica processing—until they become acquainted with MACALLEN MICA, with its accuracy of shape, thickness, flexibility and other qualities. Do you know it?

MACALLEN MICA

ALL FORMS. ALL QUANTITIES — ALL DEPENDABLE

when you think of MICA, think of MACALLEN

THE MACALLEN COMPANY 16 MACALLEN STREET • BOSTON 27, MASS.
CHICAGO: 565 W. WASHINGTON BLVD. • CLEVELAND: 1231 SUPERIOR AVE.

Paris gets 215,000 more kw's; KELLOGG provides all critical power piping!

ALONG with the need for rebuilding and expanding Europe's industrial capacity, there is a corollary need for more efficient power production, calling for higher operating temperatures and pressures. As these conditions approach and exceed 1,000°F. and 1,700 p.s.i., piping naturally becomes a major problem, demanding the most modern techniques for satisfactory solution.

For example, piping layouts for the two new 100,000 KW main turbines now installed at Gennevilliers Station were first checked on Kellogg's exclusive apparatus for determination of stresses under operating conditions.

But correct design is only one part of the problem resulting from the demand for higher efficiencies. These critical conditions call for special alloys, requiring expert fabrication and installation . . . they necessitate the creation of special devices, such as bi-metallic transition pieces that, to date, have been made only by Kellogg. And they make the quality of on-the-site stress relieving and non-destructive inspection of alloy welding a prime consideration.

Kellogg has proven its power piping techniques in providing complete piping systems for high pressure and high temperature installations producing millions of kilowatts—of which more than 600,000 KW represents plants outside the United States. Currently, Kellogg is working on numerous power projects in Europe, South and Central America as well as in the U. S. Because of these widespread activities, Kellogg's experienced fabrication and installation crews are readily available to virtually any power producer throughout the world.

Special studies of unusual problems such as graphitization to assure long life and low maintenance.

Metallurgical research by recognized specialists who have made major contributions in this field.

KELLOGG

M. W. KELLOGG

Exclusive Equipment for accurately analyzing stresses in piping and providing unique data for critical installations.

Complete facilities for the fabrication of steel products from simple forgings to specially cast bi-metallic devices.

Top welding performance in shops and in the field by welders accustomed to working under X-Ray checks.

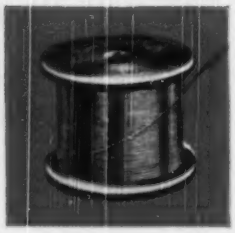
Quality control, devised by metallurgical experts, embracing forming, heat treating and non-destructive testing.

Vessels
Exchangers
Condensers
Process Piping
Forged and Welded Fittings
Radial Brick Chimneys

★

The M. W. Kellogg Company, Inc. (A Subsidiary of Pullman, Inc.) — Offices in New York, Jersey City, Buffalo, Los Angeles, Tulsa, Houston, Toronto, London and Paris

a "live wire" for *hot* spots



Vitrotex* Magnet Wire with Glass Fiber Insulation withstands temperatures of 130°C.

Highly Flexible . . . Amazing Space Factor — made possible by insulation of alkali-free glass, the insulation that's soft as silk and strong as steel!

High Dielectric Strength and Smooth Surface . . . resists moisture, acids, oils and corrosive vapors!

Vitrotex Windings Give Tighter, Safer Coils — for operation in confined spaces under high heat!

Ask the Anaconda Sales Office nearest you for complete information on the entire ANACONDA *Magnet Wire Line. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y., or 20 N. Wacker Drive, Chicago 6, Ill.*

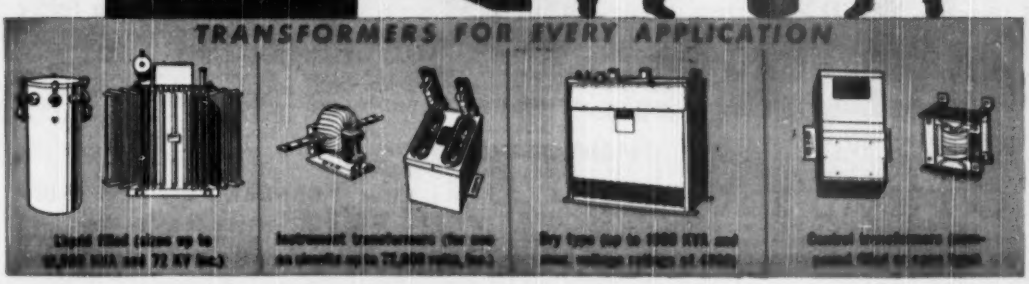
* Reg. U. S. Pat. Off. 50822

The right wire for the job **ANACONDA WIRE AND CABLE**

Your transformer needs are specifically met by STANDARD, because our facilities are exclusively devoted to transformer design and manufacture. Difficult assignments have been our meat. We design and build to your specific needs, and all designs meet NEMA and EEI standards. Use STANDARD'S quarter of a century of experience to make your installations adequate, safe and dependable.

Pictured here is a 10,000 KVA three phase power transformer designed for a specific application. Forced air cooling for 25% load increase is supplied. Used for step-up from 13,200 to 69,000 volts. Discuss YOUR transformer requirements, whether large or small, with the nearby Standard Transformer Company representative.

THE STANDARD TRANSFORMER COMPANY
WARREN, OHIO
Representatives in Principal Cities



ADVERTISEMENT

NOCRETE WITHOUT CONCRETE ENCASEMENT

Orangeburg Fibre CONDUIT NEWS

STANDARD WITH CONCRETE ENCASEMENT

MORE BUSINESS — MORE PROFITS FOR THE CONTRACTOR

VOL. 1 NO. 2 APRIL 1950 ★★★★★

LEADER AND FIRST CHOICE IN EVERY CITY AND STATE!

NOCRETE for One and Two Duct Installations

For single or double duct runs, ORANGEBURG NOCRETE (Type 2) is the *ideal* conduit. Made with heavier walls for installations *without* concrete encasement, *Nocrete* makes possible valuable savings on such installations as — factories, schools, colleges, hospitals, drive-in theatres, power, telephone and other communications systems — also service entrance, parkway and suburban lighting, airport lighting and communication.

NOW BRANDED WITH ORANGEBURG TRADEMARK

DISTRIBUTED BY

Graybar ELECTRIC COMPANY

LIGHT, EASY TO HANDLE

. . . and *more workable*. That's why Orangeburg Fibre Conduit is a big help in lowering transportation costs and speeding installation.

CUT AND WORKED ON JOB

Orangeburg can be cut with rough tooth hand saw — drilled or worked with ordinary hand-working tools.

Time Defying Materials

Unretouched photograph of Orangeburg material removed from ground after 41 years. Orangeburg withstands ground waters, acids, oils and alkalies.

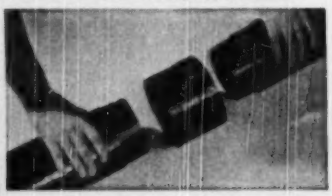
MORE ORANGEBURG AVAILABLE

. . . at *more distribution* points through Graybar Electric Company and General Electric Supply Corporation.

ORANGEBURG KEEPS FORGING AHEAD

North, south, east and west Orangeburg Fibre Conduit is the first choice of leading utilities and municipalities, many contractors and practically all design engineers. Orangeburg innovated all the important advancements of the fibre conduit industry — another reason why it's the leader.

When the installation requires duct-banks of four or more ducts, ORANGEBURG STANDARD (Type 1) — installed *with* concrete encasement — is the *preferred* conduit.



JUST A TAP OR TWO

Tapered Sleeve Couplings save a lot of time for the Contractor. A few light taps on the coupling drive it firmly against the shoulder of the conduit. This makes a permanently tight, infiltration-proof joint.

Send for Bend Section Folder

Conduit-line transformation problems like this are greatly simplified by Orangeburg Bend Sections. Illustrated folder — showing various types of Orangeburg Bend Sections and Angle Couplings, their specifications, advantages and applications — sent FREE on request. Write today to Dept. EW-3, Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y.

DISTRIBUTED BY

GENERAL ELECTRIC SUPPLY CORPORATION

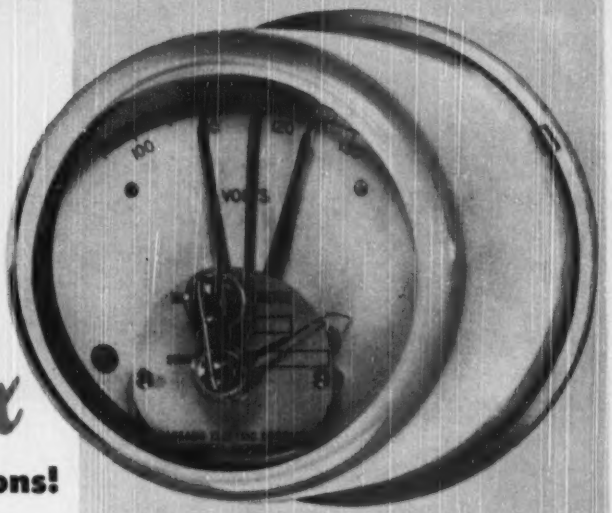
ORANGEBURG MANUFACTURING CO., INC., ORANGEBURG, NEW YORK

Distribution and Operating Engineers...

Reduce your voltage survey costs with low-cost, permanent

MiniMax

Voltmeter Installations!



Lincoln Type V-2S Indicating Voltmeter

You save money two ways by using the new MiniMax Indicating Voltmeter. It makes the use of graphic meters unnecessary in most cases, resulting in appreciable savings in meter investment; and when permanently installed, it saves the heavy labor cost of periodic surveys.

The Lincoln Type V-2S MiniMax voltmeter, time-lagged so that instantaneous values caused by sporadic conditions are not shown, is equipped with a maximum and a minimum voltage indicator on either side of a pusher pointer which is fixed to the actuating element of the meter. The pusher pointer spreads the indicators apart with changes in voltage. These indicators show the 10-minute averages of minimum and maximum voltages which have occurred since the last resetting. The pusher pointer shows the average voltage at any time.

Maximum return from existing distribution equipment results from systematically applied voltage control. Simple changes in the distribution system, such as transferring loads between transformers, changing transformer taps, balancing loads, resectionalizing, and adding transformers and regulators—often result in greater kilowatthour consumption and increased revenues. For the most effective results—at the lowest cost—make these changes on the basis of continuous voltage information provided by permanently installed MiniMax voltmeters.

Type V-2S MiniMax voltmeter, shown at left, can be installed in a standard meter socket, outdoors. Meter scales are available for voltage ranges of 95 to 135 volts, or 190 to 270 volts. The graphic form—Type CCV, at right provides a continuous *record* of average voltage. Bulletin 483 gives full information.

SANGAMO

ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

LOOK, POP,
NO HANDLEBARS!

no tools
no clamps
no concentrated stresses

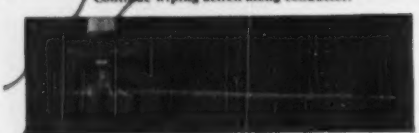
AND ½ THE INSTALLED COST

WHEN YOU PROTECT ALUMINUM CONDUCTORS WITH ALUMINUM PLP ARMOR RODS!

Take half of all the rods needed and lay them across and around the conductor.

Wrap around conductor several times . . . like wringing water from a cloth.

Continue wiping action along conductor.



The finished job.

EASILY INSTALLED in three minutes . . . even by inexperienced linemen . . . Aluminum Preformed Armor Rods protect your aluminum conductor better and at lower cost than ordinary armor.

Better because *only* PLP aluminum rods grip *uniformly* over the *entire* conductor length. Take *full* advantage of aluminum's high electrical and thermal conductivity. Protect best against galvanic corrosion and power loss from magnetic effect.

Less expensive because your linemen make perfect installations *every* time, far quicker than with ordinary armor. Less expensive because *only* PLP rods eliminate concentrated stresses common in other forms of conductor protection.

Complete technical details and installation records are available on ACSR protected by aluminum PLP rods ranging from #4 to 1,590,000 CM. Write to: PREFORMED LINE PRODUCTS COMPANY, 1051 Power Avenue, Cleveland 14, Ohio.

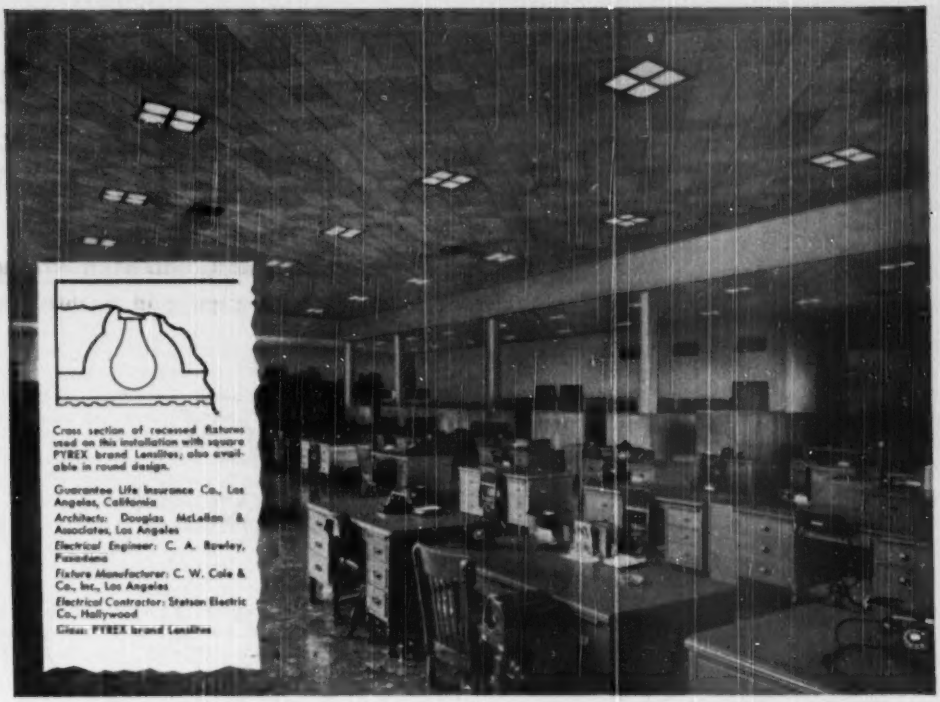
PLP ARMOR RODS ARE ALSO AVAILABLE IN COPPER, BRONZE, COPPERWELD, STAINLESS STEEL AND GALVANIZED STEEL—A TYPE FOR EVERY CONDUCTOR.

Preformed armor rods are for use under patent No. 2,275,019 —other patents pending

PREFORMED

PLP LINE PRODUCTS CO.

1051 POWER AVE. • CLEVELAND 14, OHIO



Cross section of recessed fixtures used on this installation with square PYREX brand Lenslites; also available in round design.

Guarantee Life Insurance Co., Los Angeles, California
Architects: Douglas McLellan & Associates, Los Angeles
Electrical Engineer: C. A. Bowley, Pasadena
Fixture Manufacturer: C. W. Cole & Co., Inc., Los Angeles
Electrical Contractor: Stetson Electric Co., Hollywood
Glass: PYREX brand Lenslites

How PYREX brand Lenslites can be used to produce variable intensity levels

You can obtain effective, low cost incandescent light distribution with PYREX brand Lenslites. The home offices of Guarantee Insurance Co., Los Angeles, offer a case in point. The general office, 45 ft. wide by 95 ft. long with a 14 ft. ceiling, is lighted to an average intensity of 46 f.c. Only 21 recessed fixtures are used, each fitted with four 12" square Lenslites lighted by four 300 watt bulbs. Excellent lighting is obtained for bookkeeping and other close work.

In public space under the mezzanine, an area 18 ft. wide by 108 ft. long and a 12 ft. ceiling, 21 double lenses and 5 single lenses produce an average reading of 32 f.c. The same type of fixture is used in the lobby for still lower intensity. PYREX Lenslites offer that kind of flexibility for with them light can be concentrated, spread or the beam offset.

Bulletin LS-17, available on request, contains further suggestions on the use of Lenslites and other Corning Lightingware. For regardless of the lighting requirements that may be involved, you are certain of finding what you need in this line, not only from the standpoint of light transmission but design possibilities as well. Corning lighting engineers are always ready to be of assistance to you. Why not take advantage of this right now?

CORNING GLASS WORKS
CORNING, NEW YORK
Corning means research in Glass

FOR EFFICIENT, ATTRACTIVE LIGHTING...
CORNING ALBA-LITE for diffusion of fluorescent light ... CORNING FOTA-LITE for high level illumination ... CORNING brand LENS PANELS and PYREX brand LENSLITES for prismatic light control

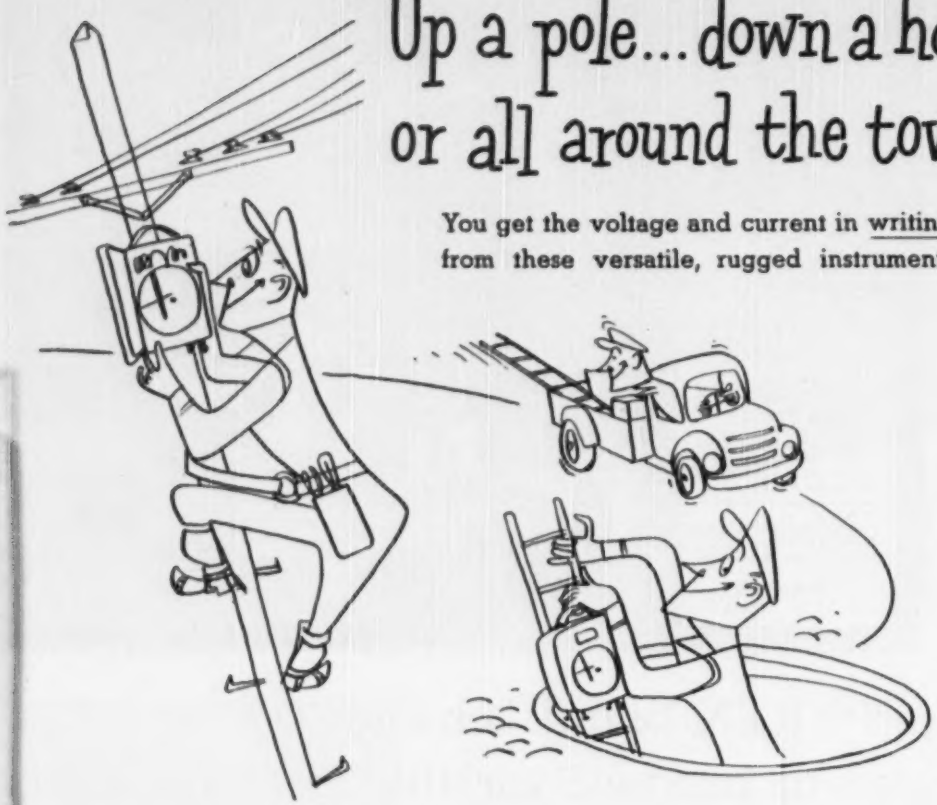
FREE—Corning Engineered Lighting Bulletin!

CORNING GLASS WORKS
Dept. EW-3, Corning, N. Y.
Send me your Bulletin LS-17 describing all Corning Lightingware.

Name_____
Firm_____
Address_____
City_____ Zone_____ State_____

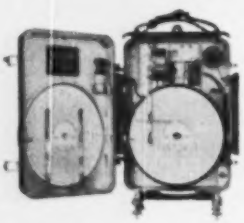
Up a pole... down a hole or all around the town

You get the voltage and current in writing from these versatile, rugged instruments



Bristol All-Purpose Recording Voltmeters and Ammeters

Lightweight and self-contained . . . all parts built for rough handling



For the most efficient operation of your electrical system, keep an eye on voltage and current.

Knowing the facts — accurate, complete, clear—you can make the necessary corrections.

Bristol's All-Purpose Recorders —with weather-proof case and light weight—handle a great variety of work . . . pole-mounted, wall-mounted (ideal for damp cellars and manholes), permanently mounted—or portable. 1, 2 or 3 pen types.

In stock for immediate delivery.

Write for Bulletin E1100. THE BRISTOL COMPANY, 116 Bristol Rd., Waterbury 20, Conn.

BRISTOL

Gives You the FACTS

When and Where You Want Them

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Kentucky Utilities Company, Inc.
chooses
Steel Towers
for 138 K. V. Single Circuit Line

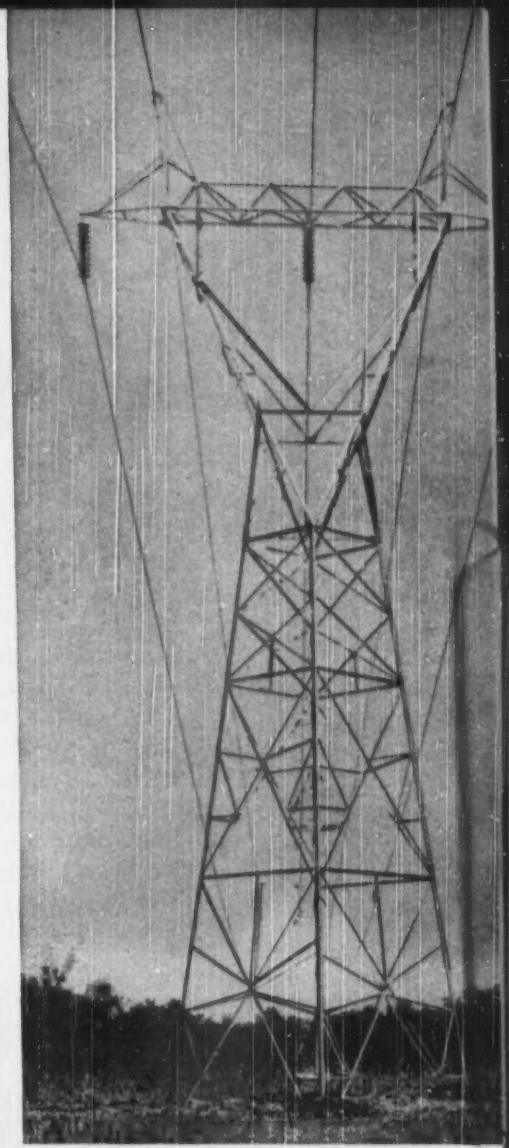
● When Kentucky Utilities Company, Inc., selected American Bridge light steel towers for its 138 K.V. single circuit line, it found that these towers made possible more severe design conditions because they had sufficient strength to carry longitudinal, transverse and vertical loads. Also, Kentucky Utilities found that foundation erection was quicker and cheaper because the circular steel grillages of the towers were designed to permit machine boring of anchors. Conductors and ground wires were carried in the most economical spans and the exact arrangement desired. And, like most things made of steel, these towers have the stamina to provide extra years of service.

To help you take advantage of the outstanding superiority of steel for structures of this type, American Bridge Company makes available its experience and facilities for designing, fabricating and erecting. Why not submit any questions you might have to our nearest Contracting Office.

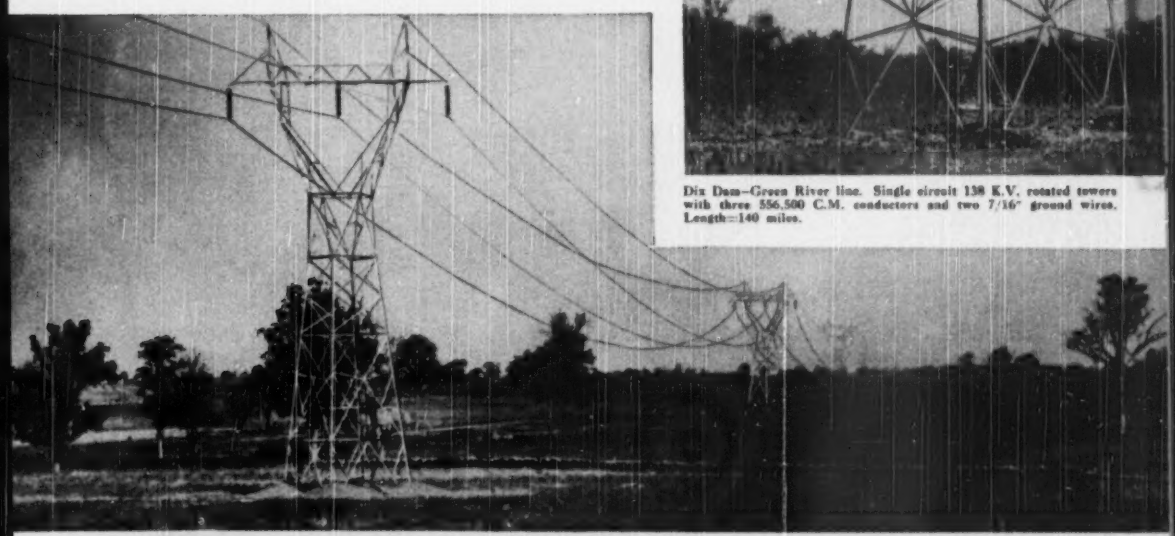
AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Contracting Offices in: AMBRIDGE · BALTIMORE · BOSTON · CHICAGO · CINCINNATI · CLEVELAND · DENVER
DETROIT · DULUTH · ELMIRA · GARY · MINNEAPOLIS · NEW YORK · PHILADELPHIA
PITTSBURGH · PORTLAND, ORE. · ST. LOUIS · SAN FRANCISCO · TRENTON
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Dix Dam—Green River line. Single circuit 138 K.V. rotated towers with three 556,500 C.M. conductors and two 7/16" ground wires. Length—140 miles.



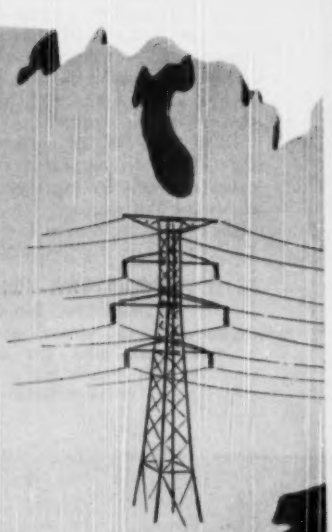
USS **AMERICAN BRIDGE**

UNITED STATES STEEL

1000 F Reheat for Oswego

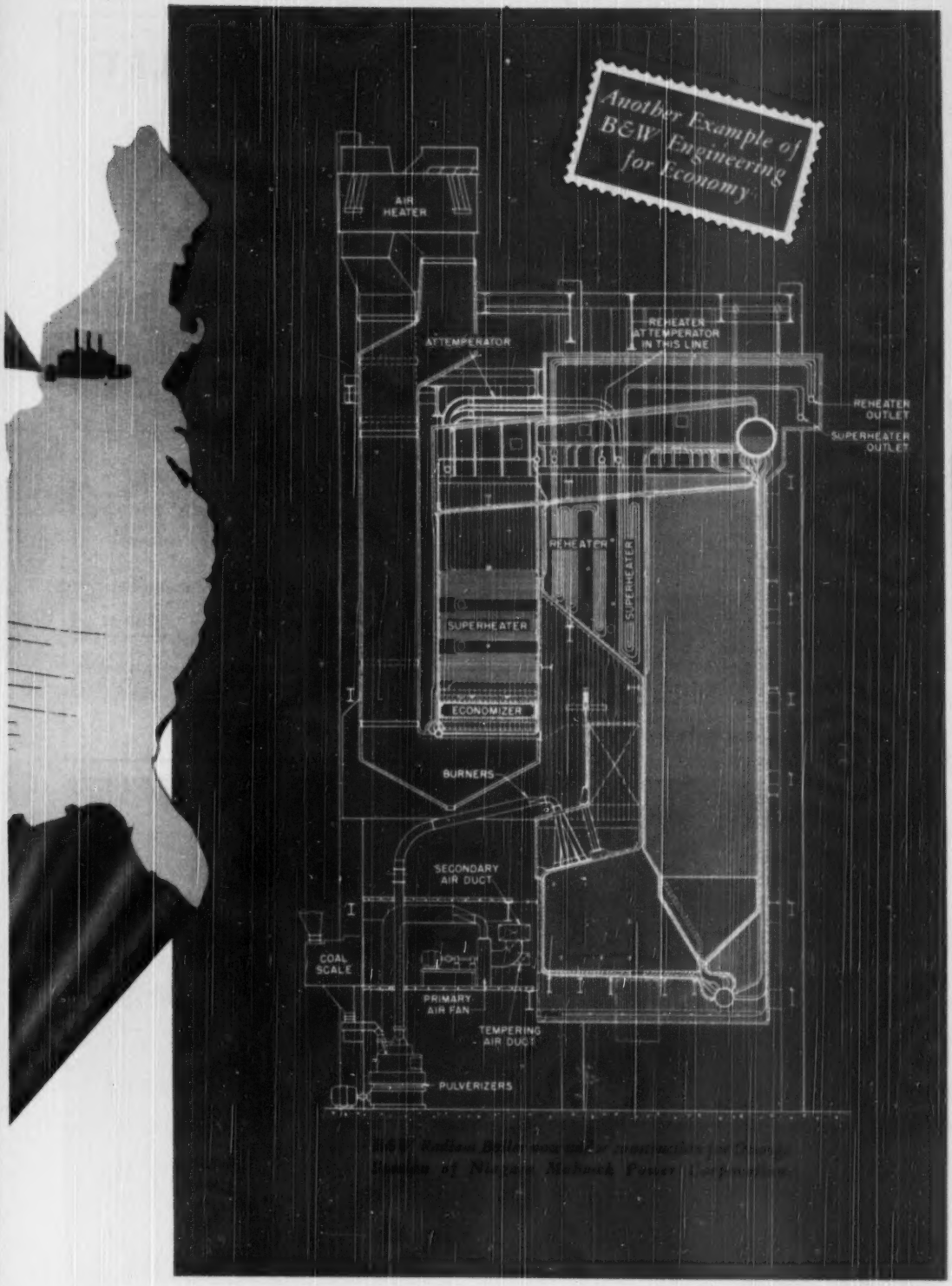
A new B&W Radiant Boiler now on order for Oswego Station of Niagara Mohawk Power Corporation, like the three B&W units already in service there, is designed for one-boiler-per-turbine operation. The new pulverized coal-fired installation will also incorporate a resuperheat cycle. Design capacity is 655,700 lb. per hr. at 1675 psi and 1000 F, with reheat to 1000 F.

This latest installation will bring the total steam capacity of B&W "solo" performers at Oswego to 3,330,700 lb. per hour.



BABCOCK & WILCOX

G-491


Another Example of B&W Engineering for Economy
AIR HEATER
ATTEMPERATOR
REHEATER ATTEMPERATOR IN THIS LINE
REHEATER OUTLET
SUPERHEATER OUTLET
REHEATER
SUPERHEATER
SUPERHEATER
ECONOMIZER
BURNERS
SECONDARY AIR DUCT
COAL SCALE
PRIMARY AIR FAN
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PULVERIZERS

Most Powerful Chevrolet Trucks Ever Built!

Plenty of power—and dependable power—to handle heavy loads at lowest cost! Two great engines bring you new power, new stamina, new and spectacular performance with economy. These 1950 Chevrolet P•L trucks are the most powerful trucks Chevrolet has ever built.

In performance, popularity, payload and price, Chevrolet is the outstanding leader! Chevrolet is the nation's choice for every trucking job . . . and on each job, these P•L trucks have established their right to leadership by years of outstanding service.

CHEVROLET MOTOR DIVISION, *General Motors Corporation*
DETROIT 2, MICHIGAN

Far ahead with all these PLus *Features:*

• TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Load-Master and the improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load • THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy action engagement • SYNCHRO-MESH TRANSMISSION for fast, smooth shifting • HYPOID REAR AXLES—5 times more durable than spiral bevel type • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • ADVANCE-DESIGN STYLING with the "Cab that Breathes" • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—precision built.

CHEVROLET P•L ADVANCE-DESIGN TRUCKS

P*opularity L*eaders

The public's overwhelming preference for Chevrolet is proof of owner satisfaction earned through the years. Beyond question, Chevrolet P•L trucks are the nation's leading choice in the entire truck field.

P*erformance L*eaders

The new Chevrolet P•L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

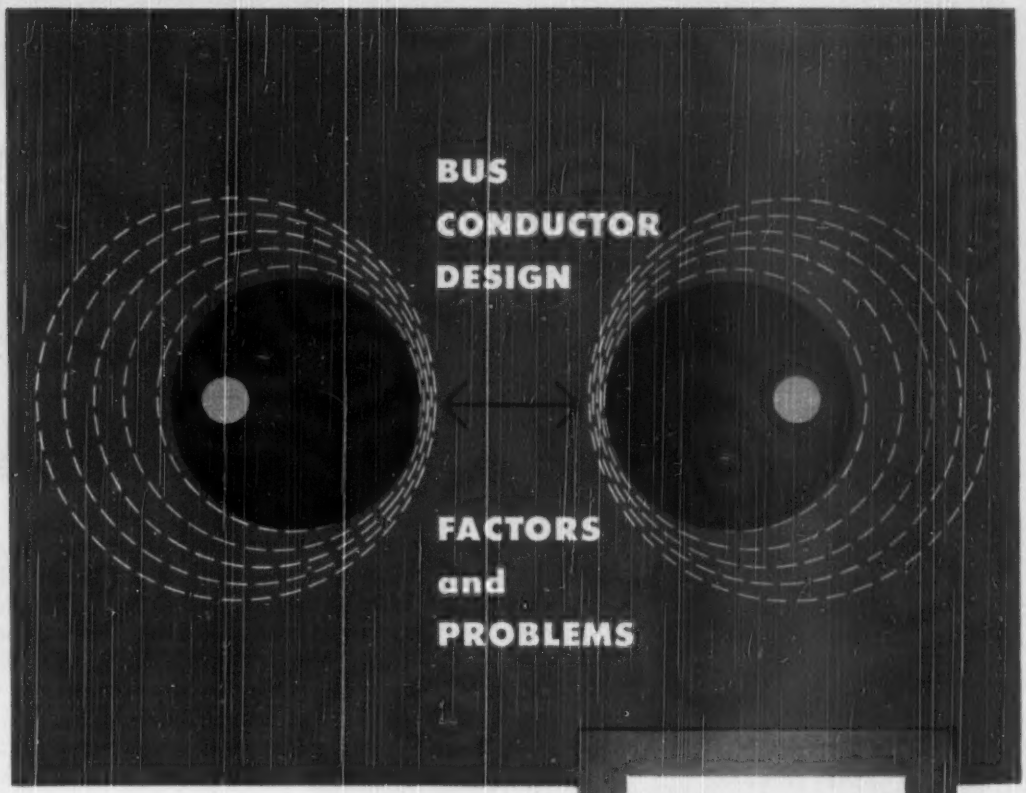
P*ayload L*eaders

The rugged construction and all-around economy of Chevrolet P•L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

P*rice L*eaders

From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value—all add up to the lowest price for you.

CHEVROLET



No. 2. Skin and Proximity Effect

In parallel rod conductors for alternating current the inductance and reactance of each rod is directly proportional to the field around it, and the current distributes itself inversely as the reactance. Maximum current density is on the outer shell of the conductor because the magnetic field, strongest at the center, becomes progressively less intense toward the surface. Field and current distribution problems complicate bus design. Our Technical Department is always available to engineers for consultation in selecting the most economical and effective types of Bus Conductors for specific requirements. Please address The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Anaconda a Bus Bar pioneer

Since the beginning of electric power development in the United States, Anaconda has served the industry with efficient conductors. Today ANACONDA *products, techniques and technicians are cooperating effectively throughout the entire field of power generation, distribution and application to provide bus equipment that will afford an optimum combination of capacity, security and economy for any specified job.*

Write for new edition of Publication C-25.

Carry the load with ANACONDA Bus Conductors

NEW UTILITY STATIONS C-E EQUIPPED

Includes stations placed in operation since the war (in white) and those under construction or being engineered.

TIDD
JENNISON
CECIL LYNCH
HAVANA
MEREDOSIA
PERMIAN BASIN
O. H. HUTCHINGS
REX BROWN
HICKLING
B. C. COBB
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SEWAREN
POSSUM POINT
PORT JEFFERSON
CUTLER
WHITE RIVER
GADSDEN
POTOMAC RIVER
W. SPRINGFIELD
WOOD RIVER

LAKE CATHERINE

HARRY NEWMAN
DAN RIVER
JIM HILL
HUTCHINSON
DUNKIRK
YATES
HAWTHORN
EDGE MOOR
TITUS
CONTRA COSTA
PALATKA
NINEMILE POINT
LEE
BLACK DOG
CLERMONT
MERAMEC
DANSKAMMER
LONG BEACH

NEW

Arkansas Power & Light Company made a substantial addition to its overall electrical capacity recently when its new Lake Catherine Steam Electric Station was placed in service. Although tied in through transmission lines to the Middle South System, this new station will serve primarily the requirements of a large aluminum plant at nearby Jones Mills.

The Lake Catherine Station is somewhat unusual in that it was begun in 1942 by the Defense Plant Corporation as a Government power plant and later abandoned. The unfinished plant was acquired by the Arkansas Power & Light Company and brought to completion by Ebasco Services, Incorporated, which handled all details of design and construction.

The two 40,000/44,000-kw Preferred Standard turbine-generators which comprise this new station are served by two C-E Steam Generating Units. These units, sectional elevation and brief description of which are given on the opposite page, are each designed to produce, at maximum continuous capacity, 450,000 lb of steam per hr.

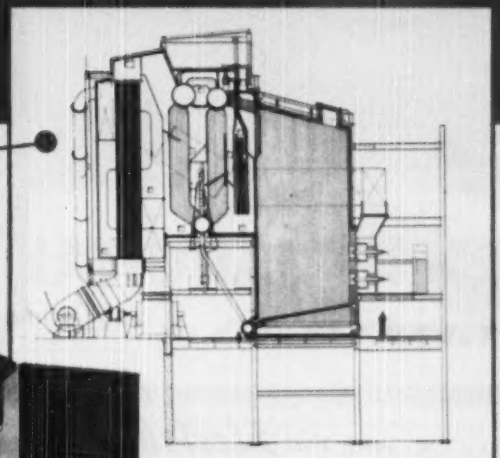
B-388

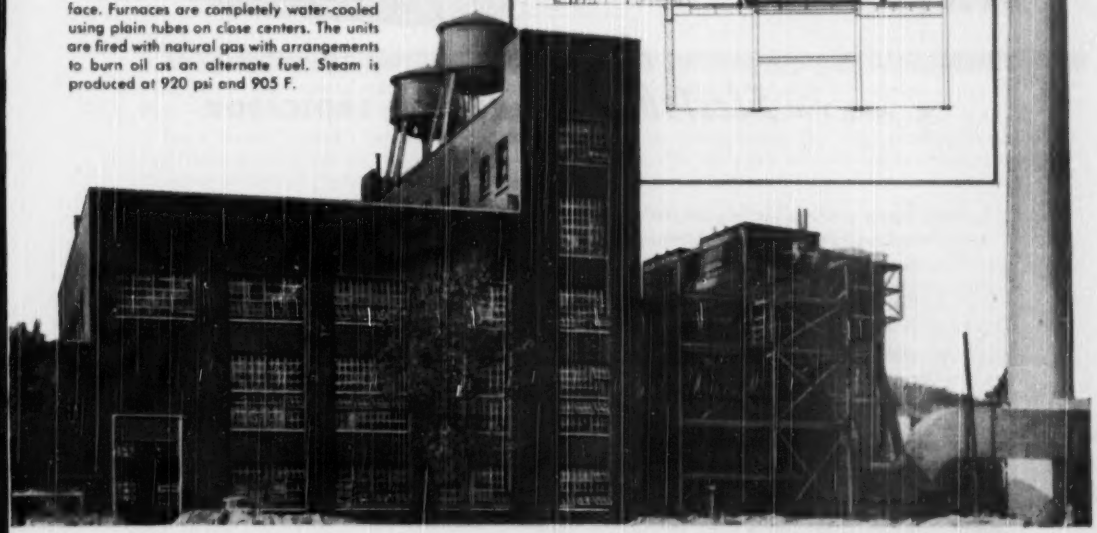
COMBUSTION ENGINEERING

A MERGER OF COMBUSTION ENGINEERING COMPANY, INC. AND THE SUPERHEATER COMPANY

Lake Catherine Station goes into service

The cross-section at the right shows one of the two duplicate C-E Units that were recently placed in service at the Lake Catherine Station. They are 3-drum boilers with superheater surface in the first pass and a bypass damper between boiler tube banks. C-E Tubular Airheaters follow the boiler surface. Furnaces are completely water-cooled using plain tubes on close centers. The units are fired with natural gas with arrangements to burn oil as an alternate fuel. Steam is produced at 920 psi and 905 F.





— SUPERHEATER, INC.

200 MADISON AVENUE, NEW YORK 16, N. Y.

ONE-STOP READING OF CRITICAL TURBINE TEMPERATURES

TURBINE EXHAUST • BLEED STEAMS • CONDENSATE • CIRCULATING WATER

BEARING OIL • THROTTLE STEAM

with the *ElectroniK* PRECISION INDICATOR

LIKE a scientific "crystal ball," the *ElectroniK* Precision Indicator permits you to keep in touch with conditions throughout the turbine. You can tell, at a glance, the exact temperature of the location "tuned in" by the button you push.

The *ElectroniK* method is the new, modern way to check important temperatures. It affords convenient, trouble-free reading from a central location . . . through a network of extension wire and thermocouples. It is fast and accurate . . . it requires a minimum of attention . . . it is insurance for continuous, safe and economical operation of the steam generation plant.

Call in your local Honeywell engineer for detailed information . . . he is as near as your phone. Ask him, too, about the special Brown Training School . . . available for the education of your employees.

Write, today, for a copy of Bulletin #90-1!

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Honeywell — *Advanced Instrumentation* FOR BETTER PROCESSING — BROWN

Whatever work your trucks do . . .

NEW INTERNATIONAL TRUCKS

ARE Heavy-Duty Engineered TO SAVE YOU MONEY

Heavy-duty engineering for long truck life on tough truck jobs is yours now in every single new International Truck from 4,200 to 90,000 pounds GVW.

That's the same extra value engineering that has kept Internationals first in the sale of heavy-duty trucks for 18 straight years.

Cost-conscious, profit-minded heavy-duty truck users have preferred Internationals year after year for only one reason: heavy-duty engineering means that International Truck performance is longer life performance, lower operating and maintenance cost performance.

And now the same management, engineers, test experts, and production men who kept Internationals a tradition in the heavy-duty truck field have developed *every new International Truck*. No matter what size truck you use, there's a heavy-duty engineered International Truck that's right and ready for you!

You'll find new comfort in the new Comfo-Vision Cab

Model for model, here is "the roomiest cab on the road." It gives you new comfort in easy-riding cushions, adjustable seats, controlled ventilation. It gives you full front visibility through a one-piece, scientifically curved Sweepsight windshield.

And comfort is right at your fingertips when you take the sturdy wheel. The entire steering system is engineered for more positive control from a more comfortable position.

You'll get an all-new truck proved under actual operating conditions

"Proved under actual operating conditions" takes in years of time, millions of dollars, countless miles. But these new Internationals took in all those and then some—to give you proved-in-advance performance.

No matter what kinds of roads or loads, climate or conditions your trucks must meet, there's a new International that has been *proved* right for your requirements.

Find out all about that truck from your nearest International Truck Dealer or Branch, *soon*.

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks . . . Industrial Power
Refrigerators and Freezers

Time in James Melton and "Harvest of Stars"
NBC, Sunday afternoons

ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

"Taking care of small customers"... That's only one of the things we mean by Service Plus!

BARS · PLATES
STRUCTURALS · SHEETS
STRIP · REINFORCING BARS
STAINLESS
ALLOY STEELS
ALUMINUM
TOOLS · EQUIPMENT
MACHINERY

● Many of our customers are probably classified as "small business." We were delighted to find, through a recent survey, that the men in charge of these so-called small companies are well satisfied with the service they get from United States Steel Supply Company. More than one said, "You take care of the little fellow." We know every order, large or small, is important to the man who places it. And we do our best to meet his requirements in handling it. If you need steel, from stock or in special sizes, forms or specifications, call U·S·S Supply Company. Your order is as important to us as it is to you.

Service Plus is our promise of *extra* attention to your needs. It includes prompt delivery, large stocks of both standard and special sizes, and an unrivaled reputation for courteous attention to your every requirement. *Service Plus* means "You tell us and we'll do it if it's humanly possible."

WHEN YOU DEAL WITH US, YOU GET Service Plus!

UNITED STATES STEEL SUPPLY COMPANY

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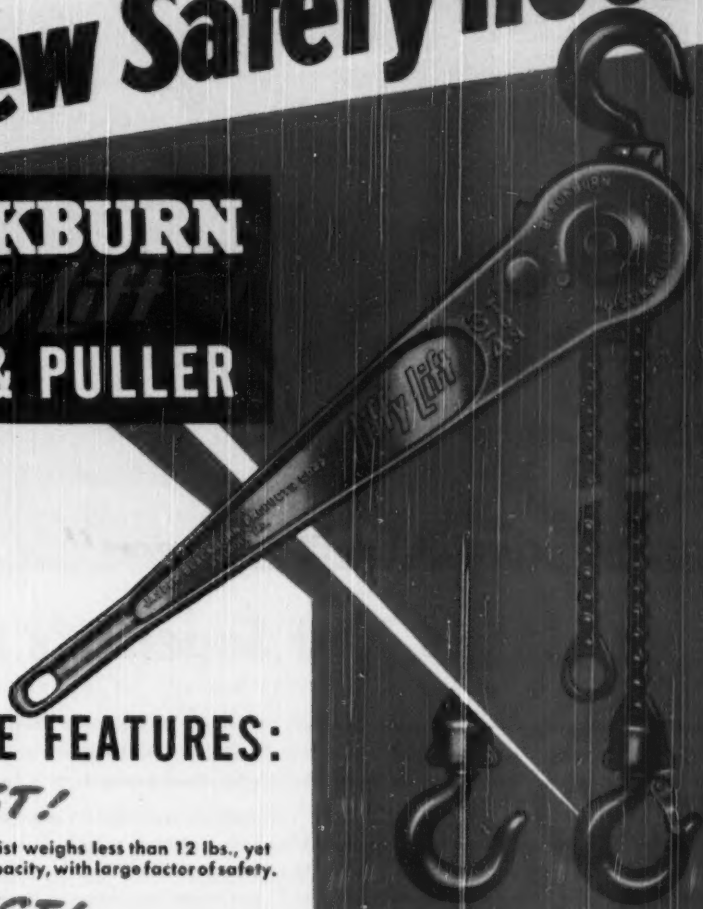
UNITED STATES STEEL

NOW with New Safety Hook!

BLACKBURN Jiffy Lift HOIST & PULLER



Safety hook is optional at a small additional cost

EXCLUSIVE FEATURES:

LIGHTEST!

Complete hoist weighs less than 12 lbs., yet has ¾ ton capacity, with large factor of safety.

SIMPLEST!

The only puller-hoist made with a single control for UP and DOWN and Automatic Free-Wheeling. Universal operation—handle operates on either side for lift or pull.

FASTEST!

Quick action, Ratchet-type. Easy to rig—quick to use. Operator can also vary lift per stroke. High efficiency means less fatigue.

JIFFY LIFT IS IDEAL FOR:

Tightening Guy Wires... Pulling Cables and Messenger Wires... Skidding or Lifting Heavy Equipment... Installing and Repairing Machinery... Pulling Motors, Wheels, etc.... Lifting in Close Quarters ... General Maintenance... In short, for any Lift or Pull.

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JASPER BLACKBURN PRODUCTS CORP.
FIRST, MADISON & CLINTON STS. • ST. LOUIS 6, MO.

Send me, without obligation, Illustrated Circular describing the Blackburn Jiffy Lift Hoist & Puller, prices on same, and name of nearest jobber.

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Firm Name_____

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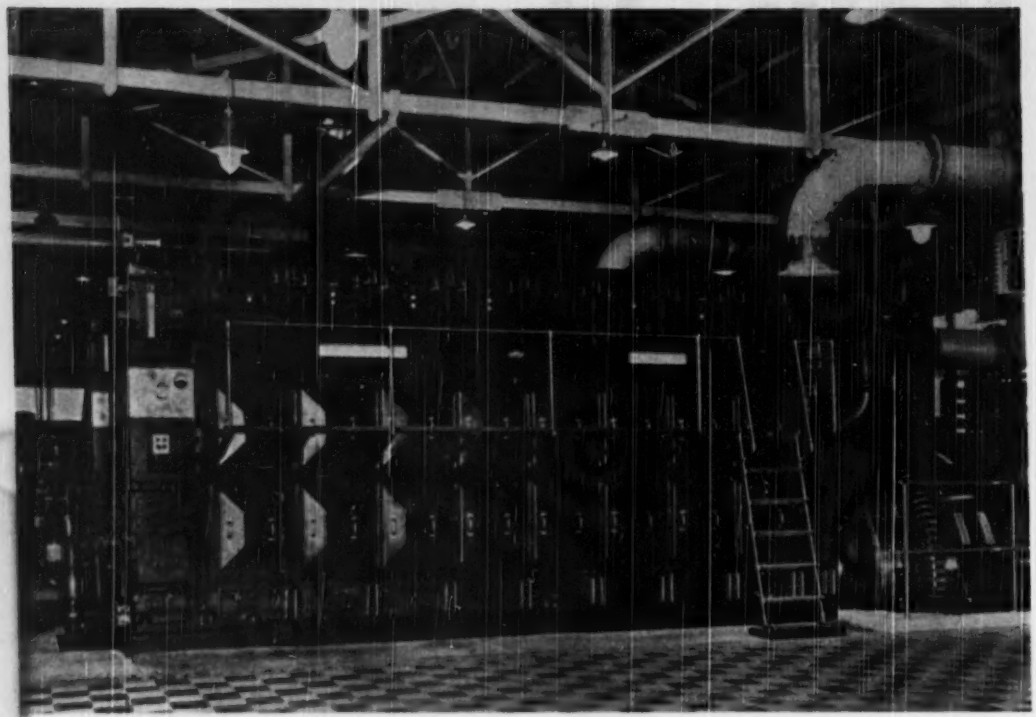


It's 2 to 1 That Superior's Best

● In 1947 a private utility in Venezuela installed two Superior Diesels and another well-known diesel of the same rating. Since operations began the Superior Diesels have lived up to their name.

These two mighty engines have a combined capacity of 2880 horsepower and they produce up to 2000 kilowatts. In spite of peak overloads and great changes in the power distribution system, the Superior Diesels have performed efficiently and proved their dependability. Downtime for routine maintenance has been held to a minimum.

Economical operation is always of prime importance. And here is where the two Superior Diesels are outstanding. Both Superior Diesels run quieter and generate more KWH per gallon of fuel than the other diesel that operates in the same plant.

There are many similar cases where Superior Diesels have provided superior performance. And their owners have benefited where it counts most . . in low-cost power production. If you're looking for such economy, why not let us have a Superior representative call? Or, if you prefer, write for our fully illustrated booklet, *Superior Diesel For Stationary Application.*

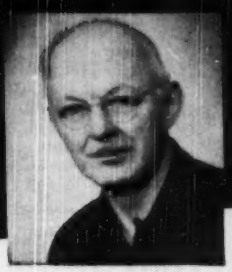
THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

THE NATIONAL SUPPLY COMPANY

Superior DIESELS

Locomotive · Marine · Oil Field · Stationary

G.E.'s 9574 all-purpose insulating varnish provides BETTER BONDING BETTER PENETRATION NO SLUDGING



Mr. Guy W. Probst

That's what Guy W. Probst, owner of the Lockhaven Electric Repair Co., Lockhaven, Pa., says about General Electric's 9574. Here is his statement:

"G-E all-purpose insulating varnish 9574 gives you a cover coat you can see and that fills up between the Formex wires. I've had very good success with it on armatures up to 2000 RPM. On formed coils I can bake before forming and the turns don't come apart when you pull the coil. I've had no trouble with sludging, and all my work is hot dipped. I find that I only use about half as much 1201 Glyptal as a cover coat on 9574 as I had to use over the varnish I had been using, and I get higher gloss and better bonding when 1201 is used over 9574."

G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G.E.'s complete line of electrical insulating materials, including adhesives, wedges, cements, compounds, cords and twines, sleeving, wire enamels, mica, papers and fibers, permafils, tapes, tubing, varnished cloths, varnishes.

EASY TO USE

BAKES AT LOWER TEMPERATURES than is possible with most other synthetic varnishes.

PENETRATES EASILY into the deepest coils.

NO SPECIAL THINNER required (just petroleum spirits).

STABLE—will not tend to harden in the tank.

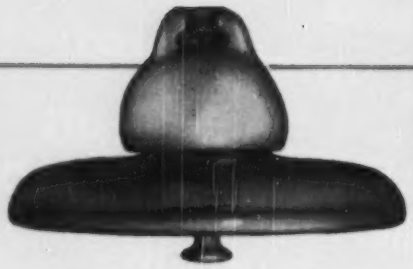
SEND FOR BULLETIN!

If you haven't yet tried G-E 9574, get in touch with your local G-E Distributor, or write for our new bulletin to Section K-2, Chemical Department, General Electric Company, Pittsfield, Mass.

You can put your confidence in

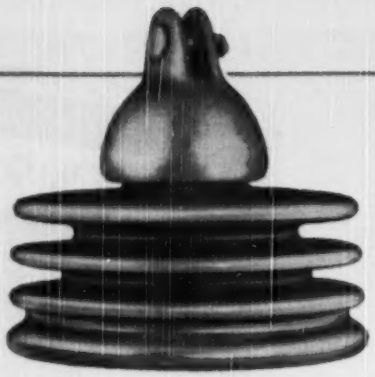
GENERAL ELECTRIC

CD30-K2



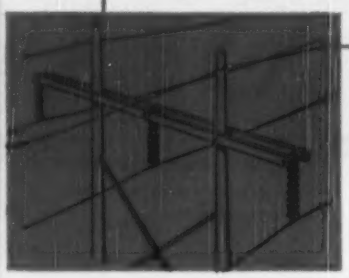
LAPP STANDARD SUSPENSION INSULATOR

"A sound piece of porcelain assembled in such a way as to permit it to live" has always been the Lapp approach to insulator design and production. It means long life and dependable operation for Lapp insulators on your lines.



LAPP FOG-TYPE SUSPENSION INSULATOR

This is the up-to-the-minute "drainage-type" adaptation of the famous Lapp-originated Fog-Type design. 25 years of service have proved eloquently the ability of this type of insulator to handle contaminated atmosphere conditions.



TIME is on our side...

and YOURS when your transmission lines hang on Lapp Suspension Discs

● Many power company executives concerned with costs . . . many engineers responsible for maintaining uninterrupted service, prefer Lapp Suspension Units because through experience they have come to depend on Lapp long life. And they have reason to.

Every year that goes by after a Lapp installation helps the cost record for line maintenance *average still lower* . . . extends the record for service which might otherwise be interrupted by insulator failure.

Lapp has pioneered many ceramic production techniques to produce porcelain of uniformly high electrical and mechanical characteristics. Lapp assures your company of benefiting from this uniformity by adhering to rigid inspection and test of every unit shipped.

Specify Lapp Suspension Units . . . watch your insulator costs go down as time goes by.

Description and specifications of Lapp distribution material appear on page 13-18 of Lapp Catalog No. Seven (green cover). If you do not have a copy of this catalog, we'll send one on request.

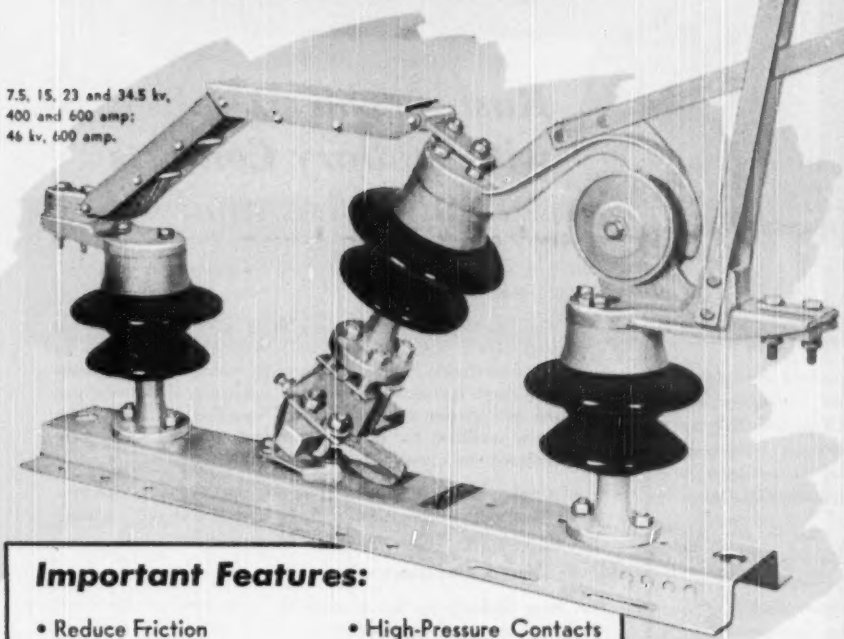
Lapp

LAPP INSULATOR COMPANY INC., LEROY, NEW YORK

Now..Rolling-Contacts on Rocking-Insulator Switches

Type SW and SWA Outdoor Air Switches

7.5, 15, 23 and 34.5 kv, 400 and 600 amp; 46 kv, 600 amp.



OPENING

Twin discs move upward and revolve when switch opens.

CLOSING

Twin discs revolve when switch closes. Note gooseneck blade that makes lengthwise wipe contact and vertical entry.

ILLUSTRATED ABOVE:

Type SW, 15 kv, 600 amp. Type SWA is similar, two insulators per pole.

Important Features:

- Reduce Friction
- "Run" Cooler
- Assure Easier Operation
- No Contact Shunts
- Solid-Silver to Solid-Silver Inserts
- High-Pressure Contacts —80 lbs.
- All Nonferrous Above Insulators
- New Terminal Reduces Electrical Joints
- Protected Flexible Jumpers

Get All Facts . .

Call

PACIFIC ELECTRIC MFG. CORPORATION

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Other Representatives in Principal Cities

Rush problems solved with Mallory Contacts and rapid-fire analysis!

Mallory bridges the gap of time when customers signify a vital need for immediate attention.

Typical is the case of a manufacturer of electrical devices for household use . . . with a complex contact problem that had to be solved in a justifiable hurry. Within eight hours, Mallory's shirt-sleeve approach had accomplished the following: the device was reviewed and proper contact material specified . . . the contact design was modified for more economical production . . . costs were analyzed and quantity price was submitted.

At a later date, the customer received additional help . . . spectrographic analyses of materials other than contact materials, leading to further product improvement for this customer.

That's service beyond specifications!

This same Mallory service is available to anyone, whether the problem is electrical or metallurgical. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Elkonite* Contacts

Elkonite is the trade name for a series of contact materials developed by Mallory and manufactured from metal powders. They are best known for their hardness, resistance to mechanical wear and impact, resistance to erosion by arcing, and resistance to sticking.

Elkonite contacts are made by the only method which permits the combining of the desirable features of basic metals which cannot be alloyed. By this means, the high melting points of tungsten, molybdenum, or their carbides, can be combined with the current-carrying ability of silver and copper.

*Reg. U. S. Pat. Off.

Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.

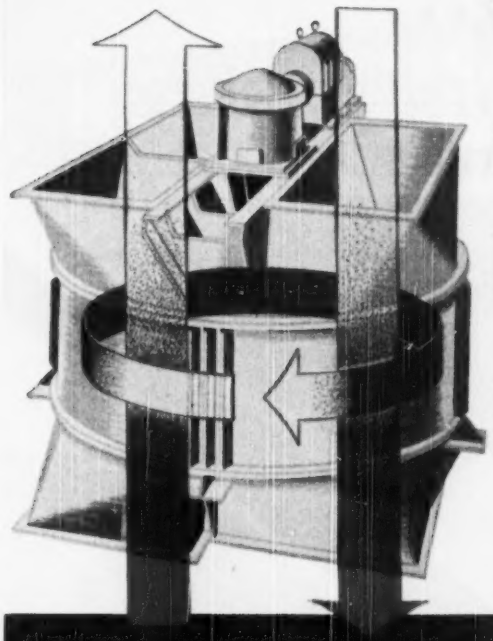
MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors	Contacts
Controls	Resistors
Rectifiers	Vibrators
Special Switches	Power Supplies

Resistance Welding Materials



this preheater is cutting fuel costs in hundreds of plants

the *Ljungstrom* AIR PREHEATER

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

The Ljungstrom air preheater has proved its value in industrial and utility plants throughout the country. That is why every year a constantly increasing percentage of the installed boiler capacity is equipped with Ljungstrom air preheaters.

Your fuel costs will be lower too, when your boiler is equipped with the Ljungstrom air preheater. The regenerative design of the Ljungstrom permits reliable operation at low exit gas temperatures. This assures the greatest possible heat recovery . . . reduces the amount of fuel required.

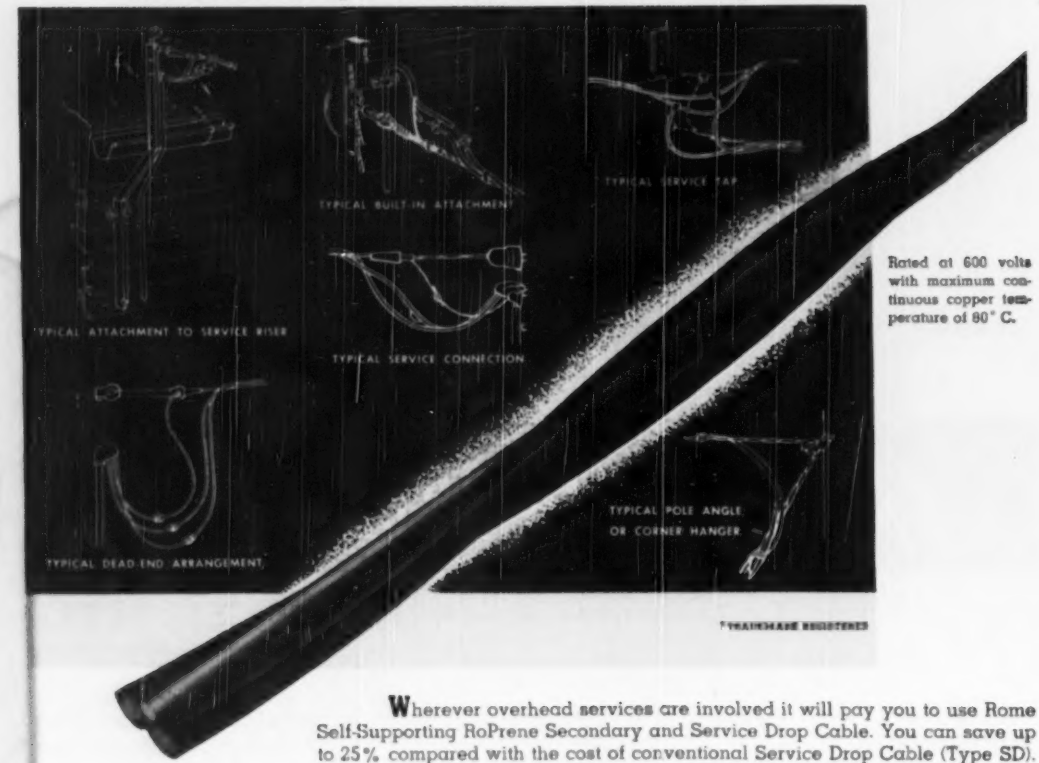
If you are planning a new installation, or expanding your present one, our engineers will welcome the opportunity to show you how the Ljungstrom can raise the overall efficiency of *your* plant.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

SAVE UP TO 25%...

with Rome Self-Supporting RoPrene Secondary and Service Drop Cable



Rated at 600 volts with maximum continuous copper temperature of 80° C.

Wherever overhead services are involved it will pay you to use Rome Self-Supporting RoPrene Secondary and Service Drop Cable. You can save up to 25% compared with the cost of conventional Service Drop Cable (Type SD). Construction is better and it lasts longer. There are no coverings to rot and festoon. It has remarkable weather resistance. It possesses excellent physical and electrical characteristics.

Installation and maintenance costs are also less than the cost of open weatherproof wire. Less labor and cheaper hardware can be used. When used as secondaries, Rome Self-Supporting RoPrene Cable is more compact, eliminates unsightly multiple wire construction, jointly occupied poles and long spans. On larger sizes, there is also a substantial saving in copper losses due to the lower reactance of a self-supporting cable compared with open wires.

NEW DATA AVAILABLE!—BULLETIN RS-4, just published contains specification and test details, as well as sag and tension data on Rome Self-Supporting RoPrene Cable. It's yours for the asking. Sign and mail the coupon below or write.

IT COSTS LESS TO BUY THE BEST...BUY ROME CABLE

ROME CABLE CORPORATION, Dept. EW-3, Rome, N. Y.
Please send me Bulletin RS-4

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

ROME CABLE
Corporation
ROME • NEW YORK
From Bar to Finished Wire

ROME CABLE ROME, N.Y.

NO ADJUSTMENTS!

ROYAL GIVES YOU DESIGN FEATURES *that Pay Off!*

ROYAL'S SWITCH-TYPE AL

TILTING INSULATOR . . .

The tilting insulator stops against the base in both open and closed position. This eliminates all adjusting stops. All through the design are operating features typical of the high engineering standards characteristic of Royal equipment.

Type AL was engineered to provide excellence of service on all installations. It has proved in hundreds of cases to be husky enough to meet all of the requirements of substation and pole-top operation.

Before you make your next switch purchase, find out what your dollars will buy for you in Royal switch performance advantages.

Type AL is built in voltage ratings up to and including 46kv, and in current ratings from 200 to 1200 amp. See full descriptions in our Catalog No. 11.

SELF-CLEANING CONTACTS

Multiple-finger, individually self-aligning, high-pressure point contacts of an exclusive design. In closing, the fingers engage the narrow axis of an elliptical cam. As the switch moves into operating position the fingers are spread to the wide axis of the cam, wiping the contact and developing high pressure contact.

CONSTRUCTION DETAILS

Standard Nema 3-in. bolt-circle insulators eliminate off-size insulators in your system. Braid jumpers are tinned copper, supported by a galvanized steel pantograph. Current carrying parts are of high conductivity, non-ferrous material. The steel tilting carriage will accommodate either a square steel or a full-size 2x4" wood interphase shaft. There is a silver-to-silver connection at the hinge end of the braid. The tilting insulator *stops* firmly and positively in both open and closed positions. There are no adjusting stops to position in the field.

35 YEARS
A Part of the Arsenal of
AMERICAN POWER PRODUCTION

Royal ELECTRIC MANUFACTURING COMPANY
INCORPORATED
1122 EAST 87th STREET Chicago 19, Ill.
Designers and Manufacturers of Power Switching Equipment and Special Electrical Devices

MEMO TO A SALES FORCE

To X.Y.Z—

There are no electrical products on the market purposely designed to give poor service.

Each reflects someone's idea of how best to do the job.

Each maker will stoutly argue for his way to do it.

Now your job is not just to PREACH that our company only has the ability to make high-quality products. They ALL say that—and buyers yawn.

Just lay before each purchasing official these reports of tests of our product conducted by an independent testing laboratory. The buyer can read—and see—and believe.

Thus the manufacturer who has unbiased testing information, also has a CONVINCING* argument

MANY INDIVIDUAL LABORATORIES FUNCTIONING AS ONE

The Story — *sent on request*

ELECTRICAL TESTING LABORATORIES, INC.

2 EAST END AVENUE
at 79th Street
NEW YORK 21, N.Y.

*Buyers and sellers of CERTIFIED Lighting Equipment find this to be so.

for SIMPLE, ACCURATE and CONVENIENT MEASUREMENTS of

RESISTANCE

•

INSULATION TESTS

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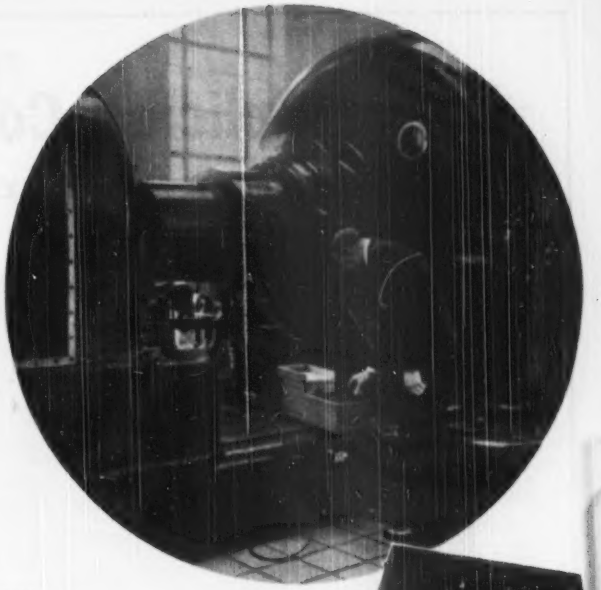
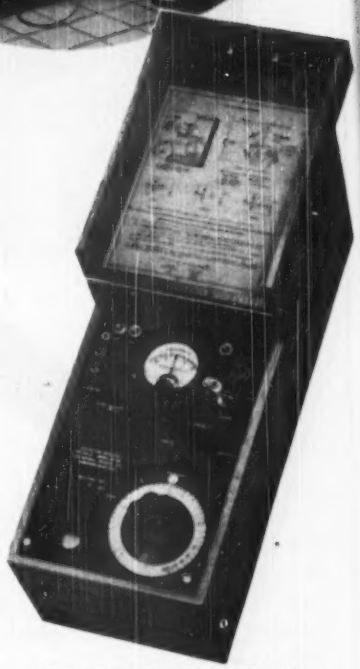
VOLUME RESISTIVITY

•

DIELECTRIC ABSORPTION





THE General Radio Type 544-B Megohm Bridge furnishes a very convenient means for making all types of high resistance measurements in the upper megohm range.

The bridge, essentially, is a combination of a Wheatstone bridge and a sensitive vacuum-tube voltmeter used as the null detector. Its range is 0.1 megohm to 1,000,000 megohms. The accuracy of measurement varies between ±3 and ±10 per cent between 0.1 megohm and 10,000 megohms.

The effective resistance scale length between 100,000 ohms and 10,000 megohms is 35 inches. The voltage applied to the resistance under measurement is substantially constant, regardless of the value of the unknown, greatly facilitating the proper measurement of insulation resistance.

Guard connections are provided for use with three-terminal networks such as multi-wire cables, multi-circuit transformers, three-terminal capacitors, networks and guarded specimens of insulating materials.

For resistance measurements such as insulation resistance of electrical machinery, generators, motors, transformers . . . single conductors, cables and capacitors . . . long sections of high voltage cable . . . paper capacitors . . . slabs of insulating material . . . and for dielectric absorption measurements in insulation of electrical machinery, transformers and cables . . . this bridge is the IDEAL instrument to use. Charge-current curves over time intervals from one second to many hours are obtained easily.

The bridge is supplied in two models: one with built-in a-c power supply (delivering the standard 500-volt test voltage), and the other with a built-in battery supply (furnishing 90 volts to the unknown).

TYPE 544-B MEGOHM BRIDGE, with a-c power supply **$295.00**

TYPE 544-B MEGOHM BRIDGE, with battery supply, including batteries **$215.00**

Write for a copy of INSULATION RESISTANCE MEASUREMENTS for complete details.

GENERAL RADIO COMPANY Cambridge 39, Massachusetts

90 West St., New York 6 920 S. Michigan Ave., Chicago 5 1000 N. Seward St., Los Angeles 38

Kerite Splicing Compound Tape

PERMANENTLY HIGH DIELECTRIC STRENGTH

Like conductors protected by Kerite insulation, joints made with Kerite Splicing Compound Tape have a successful service history of over fifty years under a wide variety of operating conditions.

Kerite Splicing Compound Tape does not require heat treatment after application.

Available in ¾-inch and 1½-inch widths. Shipment from stock in moderate quantities.

THE KERITE COMPANY

NEW YORK • CHICAGO • SAN FRANCISCO • LOS ANGELES

PIONEERS IN CABLE ENGINEERING

Facts of Life in Load Building

"POWER COMPANY sales departments are undermanned. The level of competence of their personnel is not as high as it should be. Neither is their enthusiasm."

So begins on Page 83 of this issue of ELECTRICAL WORLD the report of results from a novel and unconventional survey. Its purpose was to uncover opinions, feelings and attitudes of power company sales executives, to be combined into an overall picture of the status of load building today. To encourage frankness and candor in replies to the searching and sometimes embarrassing questions of the survey, repliers were assured of complete anonymity.

Other conclusions from the survey are that:

More than a few companies do not know in definite terms of their local conditions what loads merit heaviest promotional emphasis.

The spirit of commercial enterprise seems livelier and more prevalent among companies that merchandise appliances than among those which do not.

Appreciation of the need for load building is spreading out among top executives. But those who have no, or little, sympathy with the idea are still too numerous.

Cooperation with dealers is the general rule.

Sales executives think that unaided load growth will not be sufficient to earn needed return on investment in post-war expansion.

Concern for gas investment in combination utilities circumscribes and restricts electricity system load building.

Trade associations are doing a good job in national organization of sales activities.

These conclusions, plus others derivable from study of the survey replies, are not the affair of sales executives only. They merit the serious consideration of the whole power company executive family, clear up to the top. They are important in areas of interest outside power company management. In financial circles they have much significance. And to the general public, as users of electric service and as the beneficiaries of a free economy, they have meaning, too, even though the public is, and will remain, ignorant of them.

We put so much emphasis on the importance of the disclosures of this survey because they are a measurement of commercial enterprise, on which the power companies depend, ultimately, for survival as private business. The questionnaire was sent to the sales heads of 189 companies with 25,000 or more customers. Replies came back from 87 of them. This was a phenomenal response as surveys go. It is evidence of the strong concern in which the matter of the survey is held by the men addressed. More importantly, it is a powerful argument that their opinions and attitudes must be taken seriously.

In the past decade, the power companies have been hard put to meet the need for their service. There is danger—danger with a big red light on it—that from the experience of these ten years, company management will take too long to free itself from the way of thinking that its job is simply to supply a need. The end of that road is completion of the already well-along socialization of the industry. But the historical road on which the power companies have marched to their present greatness—the road of enterprise—is still open. This survey report from sales executives is a sign post pointing the way.

One Was Missing

THE NATIONAL Electrical Manufacturers Association took a step forward in recognition of the interdependence of the industry at its recent meeting in Chicago. Evidence of this came from the presence at the speakers' table of representatives of two other important segments of the industry. They were Edward Vanderlinde, president of the National Electrical Contractors Association and D. M. Salsbury, president of the National Association of Electrical Distributors.

The honoring of these two industry leaders is commendable and points the way to the promotion of fuller understanding. The two luncheon meetings were general in nature, covering the activities of NAED and the subject of "understanding" among men. But when outstanding men of the industry mingle, even in this manner, they take back a deeper appreciation of their responsibilities. They are given a more complete view of this great electrical industry.

As one can see, a very important element was missing from these gatherings. A top man from the electrical utility field was not in sight. Perhaps this omission was not intentional, but it raised a question. We know that invitations were extended. Some representative of this segment of the industry could have been found for this occasion. It is suggested that such be the case for future meetings of the National Electrical Manufacturers Association.

Revived Railroad Electrification

OPPORTUNITY to tap the 60-cycle power systems anywhere and everywhere is something the railroads might envision as an inducement to dust off the shelved electrification extensions. Series motors have had to be 25-cycle or dc, and the expense of conversion with rotating equipment has been one of the several shelving influences.

But now it appears that the rectifier is about to circumvent the rotating conversion and afford the locomotive d-c traction motors on its axles and pantographs on its roof making contact with a 60-cycle catenary. Weight is so much less that it may be necessary to resort to ballast to derive full adhesion at the rail. Nearly 50% more tractive effort is obtainable at low speed without sacrifice of the good performance of a-c traction motors in high-speed operation.

These are a few of the items enumerated by A. C. Monteith of Westinghouse in a recent talk to the New York Railroad Club. It was also brought out that maintenance of the newly applied equipment is low and that it has been in standardized production for years for other purposes. This in particular should appeal to the rail authorities because more recognition is being given to standardization by the roads.

It is not difficult to imagine an electrification setup somewhat resembling that adopted for the Big Inch and Little Inch pipe lines. Transmissions of the utilities were tapped at frequent intervals for the pumping substations. No paralleling transmission was necessary. Such lines are or can be made available wherever the feasibly electrified lines traverse. Little more than feeder and trolley would have to be supplied by the railroads. Poles could be used on many lines in place of heavy catenary towers.

Meanwhile the diesel electric locomotive is having its vogue with the economic and operating factors now in its favor. What next—will the railroads want to go back to coal? Will they be permanently satisfied and successful with any carried-around prime movers as contrasted with tapping a reservoir of power via the catenary? Railroad electrification is a phase of the area service toward which the electric utilities have set their goals.

Paternalism

HOW FAR can an employer's paternalism go before it becomes a matter of public concern? What overheads will a purchaser of electricians' services be willing and able to pay?

These are not idle questions. In this instance, they are directed at the agreement between the New York Electrical Contractors Association and Local 3 of the IBEW. This contract, covering electricians engaged in construction, maintenance, and repair work, goes quite far in the direction of employer paternalism. In fact, we wonder if it is not approaching the bounds of reason.

Under the terms of the new agreement a fund of $250,000 is being set up by the contractors to provide interest-free loans for union members. The employees can borrow for the purchase of homes or automobiles. We must admire the Electrical Contractors for providing thusly for the interests of the union members. But up until now, such matters have usually been left to the individual.

There are serious doubts that such a plan is in the best interest of either the public or the employee himself. The individuals will lose their individual initiative. They will miss the important but sometimes bitter experience of making their own deals with the money lenders. Certainly such organizations as credit unions could provide for their needs even if they feel that the many other financial agencies do not.

But of much greater significance is the public interest in a deal of this sort. In making a step such as this, a wide field is opened up for increasing the cost of electricians' services. This new type of overhead will put another burden on the cost of electric service. It will place another restraint on the use of electrical energy in the home, store and factory.

We believe that Local 3 and others who may wish to follow this pattern should carefully weigh the advantages and disadvantages of such paternalistic schemes. For the restraint upon the electrical industry's progress through high cost services may eventually more than cancel all the personal benefits from interest-free loans.

The Electrical Week

Consolidated Edison Co is getting ready to take over the Staten Island Edison Corp as soon as all regulatory commissions consent. This purchase will extend Con Ed's service territory to all five boroughs of New York City (p 74) . . . Private enterprise in the form of Virginia Electric & Power Co has been recommended as the developer of the controversial Roanoke Rapids project. An FPC examiner made the recommendation but the commission has to make it official (p 76) . . . Electric utilities which find their power plant construction halted by jurisdictional strikes can look for little help from NLRB. In a ruling affecting Southern California Edison Co the board has inserted another time-consuming step into the procedure for handling such disputes (p 78) . . . And Consolidated Edison and the Utility Workers Union have just signed an agreement for minimum monthly pensions of $125 for workers retiring with 30 years service. But social security benefits are included in the pension (p 79).

• • •

Interior Department swallowing of Army Engineers' civil functions—dams, power plants, etc—will be recommended by President Truman soon. But Congress will gag. It won't stand for any such reorganization plan during this election year—if ever.

Congress will slash—to about half, on the average—most excise taxes, including those on appliances and lamps, but not the 3.3% energy tax. The President will veto the cut but will be overridden.

With Marshall Plan aid Europe hopes to increase its installed electric plant capacity from 45 million kw in April, 1948, to 66 million kw in mid-1952.

FPC estimates potential installed generating capacity of undeveloped water power in the U. S. at 76,901,000 kw. Average annual generation from this capacity would be 390,706,000,000 kwhr. FPC figures show undeveloped hydro in all states but the two smallest, Rhode Island and Delaware.

Southwestern Power Administration admits it would lose money serving some municipalities under the proposed contract it has negotiated with Oklahoma companies (EW, March 13, p 73). But, argues SPA, the money would be made up elsewhere on its systems. Meanwhile, SPA along with the companies is awaiting some word of approval or disapproval from Interior Secretary Chapman.

FPC has just issued the third annual edition of "Statistics of Publicly Owned Electric Utilities." It has figures for 838 utilities for the year 1948 and can be purchased for $1 from FPC's publications section.

Total load for a television station may reach 500 kw. In each studio telecasting equipment will take 10 kw, the film room 15 kw, and lighting 45 kw.

Cost of making liquid fuels from shale oil and coal is nearing competitive levels, Bureau of Mines experiments indicate. With further reductions expected, wholesale price at the plant would average 9¢ per gal for oil shale products, 14.5¢ per gal for coal products.

Five years after V-J Day, Army surplus electrical equipment is still being sold. Recently the California public school system purchased several generating units for use by rural and remote schools for both firm and standby power.

Progress has come to Hamburg, Pa. The 66-year-old Hamburg Plow Works has abandoned steam for motive power. Twenty motors, supplied with electricity by Metropolitan Edison Co, are now doing the job.

Fuel costs per net ton increased 136%, or from $4.89 to $11.65 in a decade on the New England Electric System, but the cost per kwhr for residential service dropped 20%.

Coal still has one advantage as a fuel for electric utilities. It is the easiest and cheapest to stockpile.

Average wattage of regular lighting service incandescent lamps reached 82 w in 1949. Ten years ago the figure was 63 w.

Notes From The News

First concrete was poured March 13 for the Philpott Dam on Smith River, 13 miles west of Martinsville, Va. The project is being built by the Army Engineers . . . New York State Electric & Gas Corp will install a 50,000-kw unit in Hickling Station to increase its capacity to 85,000 kw . . . Because bad weather has delayed completion of its Dan River Plant, Duke Power Co has delayed its dedication originally scheduled for this month.

Con Ed Seeks 5th N. Y. City Borough

Purchase of Staten Island Edison Corp Would Increase Dominance of Utility Which Leads Nation in Meters, Employees, Capacity, Assets, and Revenues

FOR THE FIRST TIME since Thomas A. Edison started his Pearl Street Station in 1882, one electric utility may soon be serving practically all five boroughs of New York City. Consolidated Edison Co of New York has been serving Manhattan, Brooklyn, Bronx, and all of Queens but the Fifth Ward. Now Con Ed is negotiating with the General Public Utilities Corp to purchase Staten Island Edison Corp, which serves Richmond, more familiarly known as Staten Island.

If all regulatory agencies approve, and at present there is no audible opposition, Con Ed will further entrench itself in the No. 1 position among American electric utilities. At present it leads all others in meters, employees, capacity, assets, and revenues.

Supplies Power, Gas, Steam

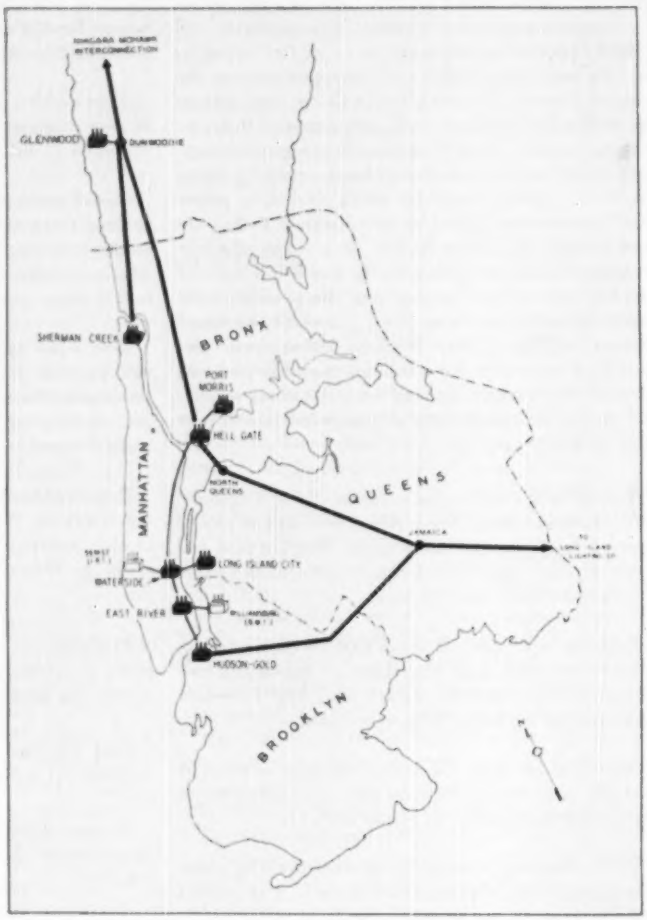
The system consists of the parent Consolidated Edison Co; Westchester Lighting Co, Mt. Vernon; and Yonkers Electric Light & Power Co. The system's territory covers 536 sq mi and stretches from Peekskill in the north to New York Bay on the south. And in addition to electric service the system supplies gas in Manhattan, Bronx, part of Queens, and most of Westchester County. Steam service is provided in lower and central Manhattan.

Con Ed has eight power plants (See map) with a total capacity of 2,952,000 kw. Their nameplate ratings are East River, 288,000 kw; Hell Gate, 630,000 kw; Port Morris, 60,000 kw; Sherman Creek, 271,000 kw; Waterside, 658,000 kw; Hudson-Gold, 881,000 kw; Long Island City, 89,000 kw; and Glenwood (Yonkers) 75,000 kw.

Some Still Prefer DC

Though most of the system is 60-cycle, transportation facilities take a sizable block of 25-cycle energy. In addition in Manhattan south of 135th St there are a large number of customers taking direct current who do not wish to changeover to ac though it is as close as the curbstone. About 38% of all meters in Manhattan are on d-c lines, but the number is constantly decreasing. There are also 273 d-c customers in Brooklyn.

In 1949 system plants produced 11,085,781,900 kwhr. In addition there were purchases of 282,576,935 kwhr to bring system input to 11,368,358,835 kwhr. This was a fraction of a percent less than the 11,418,011,492 kwhr of 1948.



CONSOLIDATED EDISON has eight interconnected power stations. The heavy lines indicate 138-kv tie feeders. Lighter lines are ties of lower voltage. Principal substations are represented by heavy dots. Missing from the map as well as the system is Staten Island which is directly west of Brooklyn. Interconnection would require underwater cables

Total sales in 1949 were 10,110,112,839 kwhr, a decrease of 0.7% from the 10,176,321,468 kwhr sold in 1948. The decrease was due to the decline in sales to subways and to other utilities. The 1949 kwhr sales by classification and the percentage change from 1948 follow:

Residential	2,117,704,005	+ 3.7
Commercial and Industrial	5,385,245,613	+ 3.3
Railroads and Railways	1,276,777,085	−12.6
Public Authorities	734,023,989	+13.9
Other Electric Utilities	596,362,147	−26.8

The system had 2,675,175 meters at the end of 1949, roughly a 1% increase over the 2,649,099 at the end of 1948. This is a reversal of the trend during

GALLON CLUB of Consolidated Edison Co is commended by the Greater New York Red Cross chapters for "giving blood to save lives and alleviate suffering." Gen. George C. Marshall, left, national Red Cross president, presents the certificate of commendation to William Von Werne, chairman of Con Edison Mutual Aid Society's blood bank committee. The blood bank supplies blood free to employees and their families. In the past three years, the bank has received 4,000 blood donations; 30 employees have qualified for the Gallon Club

the war years when the system was actually losing customers.

Unlike utilities in areas not so built up, Con Ed has been getting most of its sales increases by educating all classes of consumers to use more electricity. This is extremely difficult in the residential classification because 75% of these consumers live in apartments. These people spend much time outside their homes and depend on commercial industries for many services which small town residents perform for themselves. The result is that the average usage was only 985 kwhr in 1949, up 24 kwhr from the 961 reported in 1948. Con Ed gets only 33% of its electric revenues from residential sales, but this is made up by increased sales to the entertainment and service industries.

Like every other utility Con Ed needs personnel and facilities. It has 29,673 employees. Many of these are represented by the Utility Workers Union of America, CIO, which grew out of a former Con Ed independent union. UWU President Joseph A. Fisher is a former company employee as are most of the other national officers. Company labor relations have always been progressive (See pension story on p 79).

In addition to its great generating plants the company has had to supply equally great transmission and distribution facilities. Its distribution system is unique. Two thirds of its total electric utility plant investment is represented by distribution facilities. In the entire system area, including Westchester County, 90% of the load is served underground. In terms of miles of wire and cable 65% is underground. Buried beneath the streets of New York alone are company cables containing 134,000 tons of copper.

The underground system has 33,007 miles of cable of which 31,832 are in New York City.

The tunnel connecting Astoria in Queens with the Bronx is the deepest spot in New York City where a man can walk. The tunnel is 260 ft below the Hell Gate channel and carries two 138-kv transmission cables as well as gas, steam, and oil lines.

Con Ed has also over 20,860 miles of overhead wire of which 12,350 miles are in New York City. There are 3,498 miles of service lines with 1,817 of these in New York City. There are no overhead lines of any kind in Manhattan and not too many miles in the Bronx.

Other startling figures are 36,000 cable manholes and 4,000 transformer manholes. Each of the latter cost $11,000 with equipment.

The many skyscrapers provide other problems for the company engineers. In addition to the great load each of these buildings has, there is a wiring problem. For example Empire State, the world's tallest building, has substations in its sub-basement and on its 41st and 84th floors. These operate at 13.2 kv.

One housing project in New York City has a population nearly equal to half that of Nevada. Stuyvesant Town, on the lower East Side of Manhattan, houses 32,000 persons in 11,000 apartments. Gas and electric service are included in the rent.

To provide the proper facilities Con Ed requires a sound financial structure. Its total assets are $1,502,249,239, making it the largest of any electric or combination utility including holding companies. Its total operating revenues were $366,338,965, a decline from the $370,832,235 of 1948. The $4,493,270 decrease was caused by the reduction in electric rates ordered by the New York PSC. The company has always been a profitable enterprise. Con Ed and its predecessors have been paying continuous stock dividends for 125 years. Only 24 stocks listed on the New York Stock Exchange have a longer dividend record.

But Con Ed is still looking forward. By winter it will be getting 100 million cu ft of natural gas a day through a 1,840-mile pipeline from Texas. Most of this gas, and the amount may be increased later, will supplant oil and coke in manufactured gas operations, but there is a good possibility that in summer months surplus amounts will be available for the manufacture of electricity.

The company has already spent $263 million of the $520-million allotted for post-war construction. Another $95 million will be spent this year. Most of the $520-million total will go for improvements to the electrical system.

At present three generating units are under construction. East River Station is to have a 120,000-kv unit on the line next year and a second in 1951. Hudson-Gold will put a 60,000-kw unit on the line late this year.

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U. S. Asks New Hearing in Pacific G&E Co Case

The federal government has filed a petition with the California Public Utilities Commission for a rehearing on the commission's dismissal of its case to compel Pacific Gas & Electric Co to "wheel" power to government agencies in the state. (EW, Feb 13, p 68).

The petition declared the dismissal "constitutes a denial of due process" and that the PUC's assertion that the government had not shown rates charged by PG&E were "prejudicial, unreasonable or otherwise unlawful" or made known "exact" or "particular" types of relief it wanted was "arbitrary, capricious and erroneous in fact and in law."

It asked the commission to vacate its order for dismissal and hear the case on its merits.

OFFICERS of the National Association of Electrical Manufacturers and of other electrical associations attend a luncheon during the recent NEMA meeting at Chicago. Left to right are A. F. Shelton, E. E. Potter, and J. F. Lincoln, NEMA vice-presidents; Edward J. Vanderlinde, president, National Electrical Contractors Association; D. M. Salsbury, president, National Association of Electrical Distributors; C. T. Lawson, NEMA president; A. H. Kahn, president, Chicago Electric Association; C. W. Higbee, NEMA vice-president; C. G. Pyle, managing director, National Association of Electrical Distributors; and W. J. Donald, managing director of NEMA

Vepco Gets FPC Examiner's Okay to Build Roanoke Rapids Project

PRIVATE development has been given a green light at the controversial Roanoke Rapids site.

An initial decision by the Federal Power Commission's chief presiding examiner, March 20, approved the application of the Virginia Electric & Power Co for a license to build a $27 million, 91,000-kw hydroelectric plant on the Roanoke River in Virginia and North Carolina. Commission review of the decision by Chief Examiner Frank A. Hampton is expected to follow the certain appeal by the Department of Interior, which had opposed the application.

At the heart of the decision were two important conclusions:

1. "Approval" by Congress of a plan for development does not constitute "authorization." Roanoke Rapids is included in a comprehensive plan of the Army Corps of Engineers for development of the Roanoke River Basin.

2. Early private development is in the public interest when there is no probability that the project will be built by the federal government "for a long time to come." The decision attacked "wastage or non-utilization of water resources . . . particularly when there is a need for the energy in the area and a private developer with private capital stands ready, willing, and able to utilize them, with the protection of the public interest furnished by the terms and conditions of a federal license."

The Secretary of the Interior was granted intervener status in the case.

The examiner also:

Ordered Vepco to apply for a license for a small hydroelectric installation near the Roanoke Rapids site which the company has been operating without license for many years.

Admitted as evidence a report of the district engineer at Norfolk, Va., to the Chief of Engineers supplying data on the proposed development.

Opened the record to a statement of facts concerning the loan, approved last fall by the Rural Electrification Administration, to a generation and transmission cooperative in Virginia. The $14,320,000 loan to the Old Dominion Power Cooperative of Chase City, Va., has not yet been approved by the Virginia Corporation Commission, which is expected to act on the matter next month.

Foes of the application—Interior and the Virginia Rural Electrification Association—had contended that the FPC had no jurisdiction over the Roanoke Rapids site because of the Engineers' approved report. In distinguishing between "approved" and "authorized," Chief Examiner Hampton emphasized that, "the Corps of Engineers does not regard a project as (authorized) if it is only part of an (approved) plan." Congress, he pointed out, could have specifically reserved the Roanoke sites for federal development if it desired, but it did not.

In ordering immediate private development of the site, the examiner referred to the opinion of the commission last November in the Kings River power development in California. This decision granted licenses to Pacific Gas & Electric Co and irrigation district to develop power on the river over the objections of the Bureau of Reclamation.

Day after the Roanoke decision, the Secretary of the Interior Chapman personally appeared before the commission to urge reversal of the Kings River decision.

The Roanoke development, for which the examiner would grant Vepco a 50-year license, includes a proposed dam about 2,840 ft long with a spillway crest about 40 ft above the bed rock of the river. Power units would include three 27,000-kw generators and one 10,000-kw unit.

The site is 41 miles downstream from the Buggs Island Reservoir now under construction by the Corps of Engineers. Power from the 108,000-kw Buggs Island plant will be marketed by Interior's Southeastern Power Administration, starting about 1952.

Interior and Virginia electric co-ops had argued that the Vepco project would benefit from the federal development at Buggs Island, while federal power in the area could be firmed by linking Roanoke Rapids with the upstream plant. The chief examiner said the benefits from Buggs Island were not certain, but that if there were any, the company might utilize them. Advantages of joint operation of the two projects, he declared, were uncertain, especially since there were no federal plans for early construction at Roanoke Rapids.

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REA Phone Loan Made

The Florala (Ala.) Telephone Co has received the first Rural Electrification Administration phone loan, $243,000, to expand its facilities. The phone company will rent pole space from Alabama Power Co and three co-ops in its area.

ON PROGRAM at Westinghouse Industrial Heating School were R. W. Jeffrey, left, Pressed Steel Corp; R. H. Mariner, Corning Glass Works; F. J. Jolly, Detroit Edison Co; W. W. Shaver, Corning Glass; P. T. Lagrone, E. Griffiths; and J. B. Hall, Westinghouse Electric Corp

Sales Engineers Study Industrial Heating at Westinghouse School

THE INDUSTRIAL heating market today is not only bigger and more important to our industry than most of us can possibly imagine but is probably growing faster than any other major electric market. This was the assertion of Harry Restofski at the Westinghouse Industrial Heating School.

The school was held March 13-17 at Uniontown, Pa. Restofski of West Penn Power Co is chairman of the Edison Electric Institute Commercial Division General Committee whose Industrial Power and Heating Section cooperated in sponsoring the school. Some 160 utility company power sales engineers attended.

The number of man hours spent by Westinghouse in joining and treating materials alone has grown to approximately 4.5 million annually, and the curve is still rising. E. Griffiths, consulting manufacturing engineer for Westinghouse, said. He pointed out the amount of business which is available in extending the use of heat application.

Within ten years infrared should account for approximately 4% of the estimated increase in the total kilowatt capacity requirements for the electric utility industry, declared J. D. Hall, Westinghouse. From the standpoint of the public utility, he said, the cost per kwhr in promoting the use of infrared should compare very favorably with the cost involved in developing domestic appliance load.

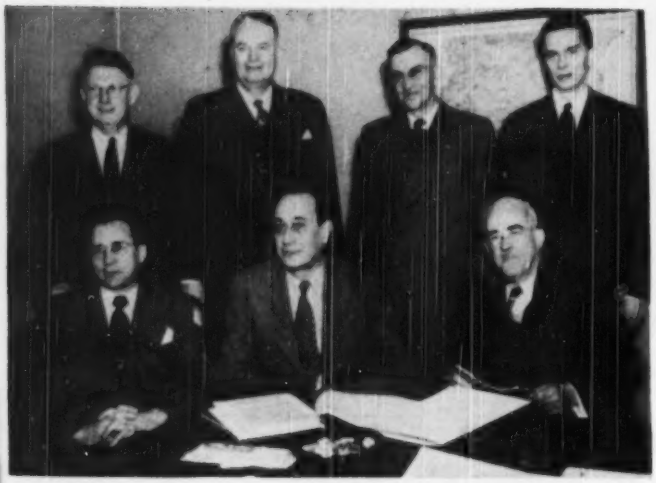
Approximately 100,000 kw of new industrial infrared load is added per year with an annual revenue of about $4 million, according to R. W. Jeffrey, Fostoria Pressed Steel Corp. He said that this is equivalent to the addition of roughly 80,000 domestic customers to utility lines with 100% power factor loads, good load factor, and, when properly done, freedom from service troubles.

From a utility standpoint, induction and dielectric heating equipment is an excellent load builder, of good average demand, high power factor, and in ratings 10 kw and above a balanced 3-ph load, according to Carl P. Bernhardt, Westinghouse. He said that induction heating has proved itself in innumerable applications over the last few years by its ability as a production tool to make things faster, better, and cheaper.

Approximately 500 million kwhr of energy were consumed by arc welding in 1949, C. H. Jennings, Westinghouse, estimated. He said that the large savings made possible by this process result in less expensive products. As the costs of products fall, demand for them rises as does the consumption of electricity.

G. R. Conover, Westinghouse, said that the load required by soldering irons is attractive because there are so many.

SPEAKERS at the Westinghouse Industrial Heating School included, left to right, C. E. Peck and W. A. Towle, Westinghouse Electric Corp; R. L. Whitney, Westinghouse Electric Supply Co; G. R. Conover, Westinghouse Electric Corp; J. B. Christopher, Ohio Power Co; and E. C. Hubbert, Philadelphia Electric Co. In right panel, left to right are C. H. Jennings, Westinghouse; C. H. Barnett, Young Brothers Co; L. B. Rousseau, Ajax Electric Co; J. W. Nelley, consulting engineer, Colonial Heights, Va; P. A. Duker, Detroit Edison; Eric O'Hara, Cincinnati Gas & Electric Co; A. M. Newcome, Wheeling Electric Co; and Samuel Arnold, III, American Bridge Co



TEMPORARY Water Resources Policy Commission which has been appointed by President Truman to study and to make recommendations to him on existing federal legislation and policies in the water resources field is headed by Morris L. Cooke, one-time REA administrator. Left to right, seated, are R. R. Renne, president, Montana State College; Lewis Webster Jones, president, University of Arkansas; Morris L. Cooke. Standing, Leland Olds; Samuel B. Morris, Department of Water & Power, Los Angeles; Paul S. Burgess, dean, College of Agriculture, University of Arizona; and Gilbert White, president, Haverford College

NLRB Ruling of Little Assistance in Halting Jurisdictional Strikes

ELECTRIC UTILITIES can look to the National Labor Relations Board for little help in ending jurisdictional strikes which delay power plant construction. That's about the only conclusion derivable from the Board's recent ruling which added a time-consuming step to its handling of such strikes.

The Taft-Hartley Act, which outlawed jurisdictional strikes, also empowered NLRB to settle disputes among unions as to which should do a specific job. But now the Board has ruled that it must settle the jurisdictional question before action can be brought against strikers. And then, the Board's 3-2 decision indicates, it is up to the complaining party in the matter to prove that a jurisdictional strike still exists.

The ruling arose from a dispute over installation of a generating unit by the Westinghouse Electric Corp at the Southern California Edison Co's new Redondo Beach plant. In February, 1949, 600 members of AFL construction unions struck in support of demands of the Millwright and Machinery Erectors, Local 1607, of the AFL Carpenters Union, that Westinghouse employ members of this union to install the equipment. Westinghouse had employed members of the International Association of Machinists, an independent union, to do the job.

IAM asked NLRB to solve the jurisdictional question. At the same time, it complained that the AFL unions were engaged in an illegal strike.

The AFL strike halted work on the rest of the generating plant until Westinghouse discontinued the generator installation. In May, after NLRB had ruled that AFL could not prevent Westinghouse from hiring IAM members, NLRB Counsel Robert Denham obtained an injunction from a U. S. District Court forbidding continuation of the jurisdictional strike.

Meanwhile an NLRB examiner, relying on the Board's determination of the jurisdictional issue, had found the AFL group guilty, without hearing evidence as to whether the Board's decision had been complied with. It was this decision which the board itself reversed, holding that it must be proved that the AFL union had engaged in a jurisdictional strike. And, said the majority of NLRB, it is up to IAM, the complainant, to prove it.

AEC and Fluor Talking Over Reactor Contract

The Atomic Energy Commission is negotiating with the Fluor Corp. Ltd., Los Angeles, for construction of a materials testing reactor to be built at AEC's testing station near Arco, Idaho. L. E. Johnston, manager of AEC's Idaho operations office, said the company was selected Feb 20 after consideration of 80 firms interested in the contract. The materials testing reactor is the second scheduled for construction near Arco. Construction already has been started by the Bechtel Corp, San Francisco, on an experimental "breeder" reactor.

Primary purpose of the materials testing reactor is to test under conditions of severe neutron bombardment the materials which may be used in future reactors, including those producing power. The materials to be tested will be contained in test pockets within the reactor. The neutron bombardment to which the materials will be subjected will be of an intensity very much greater than any to which materials have been previously exposed.

Power reactors of the future are expected to operate at greater neutron intensities than those operating today. For that reason, AEC explained, it is important to learn how various materials that might be used will react.

The contract being discussed with Fluor covers more than 50% of the construction cost, estimated to be at least $20 million. The Fluor portion of the contract includes the reactor itself, the reactor building, and auxiliary facilities directly connected with operation of the reactor.

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Alabama Power Upheld on Assessment Protest

A two-judge Circuit Court has upheld the contention of Alabama Power Co that the state can't tax utilities on a higher base than other property owners. The ruling was on a demurrer. The state has 30 days to answer, and the case will probably be heard on its merits in April.

Utilities have been paying taxes on approximately 45% of their assessed valuation. A former revenue commissioner raised this to 60%; other state taxpayers pay on 40%.

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Renews Utility's Franchise

The electric franchise of Iowa Public Service Co has been renewed for 25 years by Lytton, Iowa.

Yields—Operating Electric Utility Securities

Date or period	Bonds			Preferred Stocks			Common Stock		
	1st Quality	2nd Quality	3rd Quality	1st Quality	2nd Quality	3rd Quality	1st Quality	2nd Quality	3rd Quality
1950									
Mar. 16	2.58%	2.60%	2.71%	3.79%	4.00%	4.38%	5.13%	5.78%	6.37%
Mar. 9	2.58	2.59	2.71	3.80	4.00	4.40	5.16	5.76	6.50
1949									
Mar. 14	2.71	2.79	2.93	4.00	4.27	4.67	5.77	6.73	8.01
Mar. 7	2.71	2.80	2.94	3.99	4.28	4.67	5.80	6.77	8.11
LAST FOUR QUARTERS									
4th 1949	2.59	2.61	2.72	3.85	4.06	4.46	5.37	6.15	7.01
3rd 1949	2.61	2.65	2.77	3.88	4.15	4.54	5.55	6.47	7.51
2nd 1949	2.69	2.75	2.88	3.98	4.26	4.66	5.94	6.96	8.14
1st 1949	2.70	2.78	2.92	4.00	4.27	4.67	5.78	6.69	8.08

Data: Reis & Chandler, Inc.

Yield on third quality common stock took a nosedive March 16 as the stock market hit its highest price level since 1946.

In terms of ELECTRICAL WORLD's index of operating electric utility securities, third quality common stock yield declined from 6.50%, March 9, to 6.37%, March 16. Wall Street's bull market was responsible. Utilities, performing even more spectacularly than other groups, hit their highest average since Nov 9, 1941, and matched their 1946 top. Ending at 43.74, the utility average was the first to reach the 1946 level.

First quality common and two preferred indexes also declined, though less sharply, while bond indexes remained almost unchanged. Second quality common failed to conform with the trend, rising from 5.76 for March 9 to 5.78, at market close March 16. A break in the price of one of the ten stocks used in computing the index caused the discrepancy. It fell two points when the date of record for a new offering of rights to stockholders arrived.

Consolidated Edison, UWU Agree on $125-Month Minimum Pension

A MINIMUM pension of $125 a month will be granted Consolidated Edison Co of New York employees with at least 30 years of service under a two-year agreement reached by the company and the Utility Workers Union, CIO, last week.

The program was described by UWU leaders as "the best pension plan in the country." They said it was equivalent to a 25¢-an-hour wage increase. Con Ed will pay all costs, but social security payments will be included in the pensions.

Union officials in New York hailed the arrangement as breaking the $100-a-month pattern in other industries. Officials of the International Brotherhood of Electrical Workers, AFL, in Washington indicated the Con Ed precedent probably would not affect their policy of asking for straight wage increases instead of pensions.

Ohio Power Co employees also got a boost in their pension benefits last week when the company offered an increase averaging 50%, to be effective May 1. Ohio Power's amended retirement plan, whose benefits are substantially below those given by Con Ed, will be available automatically to non-union employers and has been offered to the unions.

The Con Ed program, which the union considers its fifth round of wage increases since the war, will apply to 4,000 former workers already retired as well as to the 30,000 present employees. It will become effective April 1.

Under the new formula workers who retire at 65 after 30 years' service will receive an accumulation of 2% of their average annual salaries. The formula thus calls for retirement pay of at least 60% of the worker's average annual income, with $125 a month as a minimum. The minimum for workers with 25 years of service will be $100. Actually most employees will get at least $150 a month, Patrick J. McGrath, UWU vice-president, said. Average period of service is 18 years.

The pension plan will cost Con Ed $5.5 million a year, the union estimated. Under the new ruling announced the week before by the New York Public Service Commission, it must be financed out of current operating expenses. Also part of the settlement were a new wage progression program and improved holiday benefits, to cost an additional $3,550,000.

Con Ed said its subsidiaries have had non-contributory pension plans since 1895. Under the system most recently in effect a worker with 30 years' service and an annual salary of $3,473.60 would have received $109.53 a month, compared to $151.58 under the new plan.

Under Ohio Power Co's revised plan such a worker would get $100 a month, the minimum after 25 years of service. The pension does not include social security benefits, however.

Retirement income at Ohio Power will be based upon a percentage of the employee's highest average salary for any five consecutive years of the last ten years of employment. The pension would be 1% of earnings up to $3,600 a year, plus 1½% of annual earnings over $3,600, multiplied by the number of years of accredited service.

Both company and employees contribute to Ohio Power's pension program. However, the increase will involve no additional cost to the workers.

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Puget Sound P&L Asks 1949 Taxes from PUD's

Puget Sound Power & Light Co, Seattle, is seeking recovery of more than $47,000 paid in taxes in 1949 through a suit filed in Mason County Superior Court at Shelton, Wash., against five public utility districts.

The taxes concern property the company sold the PUD's of Lewis, Mason, Pacific, Grays Harbor, and Cowlitz Counties in 1948 and 1949. Sales occurred before the end of the tax-levying periods. Largest amount, totaling $24,200, is sought from the Lewis County PUD. Amounts sought from other PUD's include Cowlitz, $13,728; Grays Harbor, $7,779; Mason, $1,455; and Pacific, $365.

FINANCIAL BRIEFS

Westinghouse Electric Corp expects to offer next month a new issue of 500,000 shares of common stock to be sold to employees at below market prices through a continuous payroll deduction plan. The price is expected to be $4 below the market price but not less than $25 nor more than $35.

The proposed sale by Metropolitan Edison Co of $7 million in first mortgage bonds and 30,000 shares of cumulative preferred stock has been postponed be-

cause the company has not yet obtained approval of a preliminary financing step. This step calls for General Public Utilities Corp, the parent, to make a $4-million capital contribution to Metropolitan Edison out of proceeds from the proposed sale of Staten Island Co. Another GPU subsidiary, New Jersey Power & Light Co, recently sold 20,000 shares of $100-par cumulative preferred stock.

A major step in the divestment programs of Standard Gas & Electric Co and its subsidiary Philadelphia Co will be taken this week with Philadelphia's sale of Equitable Gas Co. Under the SEC-approved plan Philadelphia is transferring all its oil and gas properties to Equitable before selling the latter.

New Jersey Power & Light Co is discontinuing use of the Rate Adjustment Plan as a means of regulating its charges for electricity, it has notified the Board of Public Utility Commissioners. The action followed after the board refused the company's requests for a rate increase and a boost in the basic rate of return for the year 1948. The stabilizing reserve set up under the plan was depleted because of the 1948 ice storm and higher material and labor costs, New Jersey P&L said.

The proposed sale of Staten Island Edison Corp to Consolidated Edison Co has been approved by the New York Public Service Commission.

A device to encourage further stockholder investigation of company affairs is being used by Florida Power Corp in its 1950 annual report. Attached to the report is a postcard on which stockholders are asked to write questions or comments.

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Out-of-Court Settlement Reached in Iowa Suit

A stockholder's suit against Iowa Electric Light & Power Co, Cedar Rapids, has been dismissed following an out-of-court settlement.

Iowa Electric Light sold its stock interest in other utilities between 1935 and 1939 to avoid registration as a holding company. Edwin P. Hughson, Buffalo, N. Y., charged in his suit that the holdings were sold at too small a price. Part of the dismissal agreement was the offer of Sutherland Dows, president of the utility, to give the company an option to purchase his 1,998 shares of Iowa Electric Co for $1,000.

RECENT RATE CHANGES

Florida Power Corp has cut rates to its wholly owned subsidiary, Georgia Power & Light Co, by approximately $195,000, based on a comparison with the 12-month period ended July 31. After complaints by the Georgia Public Service Commission and a number of Georgia municipalities, the Federal Power Commission on its own motion began investigation of Florida Power's rates to Georgia P&L Nov. 30, 1948. Later the study was enlarged to include the latter company's rates to Florida Power. The two operate an interconnected system. Agreement finally was reached after conferences between representatives of the utilities and the commissions.

Sacramento (Calif.) Municipal Utility District's new street lighting and traffic signal rate schedules will cut nearly 7% from power bills of municipalities, public agencies, and lighting districts within the district for a total of some $7,700. The City of Sacramento, the district's largest street lighting customers, will save about $5,500 a year. Under the new system signal installations will be served on a flat monthly charge.

Carolina Power & Light Co, Raleigh, N. C., has been granted an increase in industrial rates of approximately $228,000 a year, about three-fourths the amount requested, by the State Utilities Commission. The Commission settled a year-old fuel clause controversy by allowing CP&L to drop the base cost of coal in the clause from $7 to $6 a ton. But it made benefits from the clause contingent on changes in the energy content of the coal used.

Clark County Public Utility District, Vancouver, Wash., will increase rates slightly less than 10% to retire a $500,000 bank loan in an estimated four years. The loan will be used to repair storm damage and rebuild the PUD's electric system. Bonneville Power Administration has approved the rate increase provided it be on a temporary basis.

Central Arizona Light & Power Co has reduced commercial rates. The rate remains at $1 for the first 12 kwhr but has been cut from 4 to 3½¢ a kwhr for the next 538 kwhr and to 2½¢ a kwhr from then on. Industrial and residential users are not affected.

MEETINGS

American Public Power Association
Annual Convention, Shoreham Hotel, Washington, D. C., March 28-30.

Missouri Valley Electric Association
Engineering Conference, President Hotel, Kansas City, Mo., March 29-31; Annual Meeting, President Hotel, Kansas City, Mo., May 16; Accounting Conference, President Hotel, Kansas City, Mo., May 18-19.

Public Information Program
West North Central Region, Minneapolis Athletic Club, Minneapolis, Minn., March 30; National Meeting, Drake Hotel, Chicago, Ill., April 28.

Pennsylvania Electric Association
Communications Committee, Spring Meeting, Lawrence Hotel, Erie, Pa., March 30-31; Accounting Conference, Benjamin Franklin Hotel, Philadelphia, Pa., April 24-25; Industrial Committee, Industrial Power Conference, Bedford Springs Hotel, Bedford, Pa., May 2-3; Transmission and Distribution Committee, Spring Meeting, Alexander Hotel, Hagerstown, Md., May 25-26. Joint Meeting, Traffic Safety Committee, May 26.

Edison Electric Institute
Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., April 4-6; Meter and Service Committee, Netherlands-Plaza Hotel, Cincinnati, Ohio, April 17-19; Industrial Relations Committee, Netherlands-Plaza Hotel, Cincinnati, Ohio, April 20; Industrial Relations Committee, Purchasing and Stores Committee, Schroeder Hotel, Milwaukee, Wis., April 24-26; Prime Movers Committee, Hydraulic Power Committee, Accident Prevention Committee, Edgewater Beach Hotel, Chicago, Ill., May 1-2; Electrical Equipment Committee, Edgewater Beach Hotel, Chicago, Ill., May 2-3; Transmission and Distribution Committee, Cosmopolitan Hotel, Denver, Colo., May 25-26; Annual Convention, Auditorium, Atlantic City, N. J., June 5-7.

National Association of Corrosion Engineers
1950 Conference, Hotel Jefferson, St. Louis, Mo., April 4-7.

Midwest Power Conference
Sherman Hotel, Chicago, Ill., April 5-7.

American Institute of Electrical Engineers
Conference on Protective Welding, Hotel Detroit Leland, Detroit, Mich., April 5-7; Great Lakes District Meeting, Hotel Hayes, Jackson, Mich., May 11-12; Summer General Meeting, Huntington Hotel, Pasadena, Calif., June 12-16.

American Society of Mechanical Engineers
Spring Meeting, Hotel Statler, Washington, D. C., April 12-14; Semi-annual Meeting, Hotel Statler, St. Louis, Mo., June 19-23.

Southeastern Electric Exchange
Annual Conference, Greenbrier Hotel, White Sulphur Springs, W. Va., April 12-14.

Northwest Public Power Association
Semi-annual Convention, Davenport Hotel, Spokane, Wash., April 17-19.

* **Indiana Electric Association**
Young Men's Utility Conference, Ilpaco Hall (Indianapolis Power & Light Co.), Indianapolis, Ind., April 18-19.

American Institute of Electrical Engineers
Power Conference, sponsored by Committee on Power Generation, Industrial Power System, and System Planning, William Penn Hotel, Pittsburgh, Pa., Power Generation, April 19, Industrial Power System, April 20.

Electrochemical Society
Annual Convention, Statler Hotel, Cleveland, Ohio, April 19-22.

Tennessee Valley Public Power Association
Annual Convention, Andrew Jackson Hotel, Nashville, Tenn., April 20-21.

* **Northwest Electric Light & Power Association**
Engineering & Operation Section, Vancouver Hotel, Vancouver, B. C., April 26-28.

Oklahoma Utilities Association
Annual Convention, Biltmore Hotel, Oklahoma City, Okla., May 4-5.

Commercial and Industrial Electrical Exhibit
Sponsored by Electrical Manufacturer's Representatives Association of Michigan, Convention Hall, Detroit, Mich., May 10-12.

Public Utilities Advertising Association
Annual Convention, President Hotel, Kansas City, Mo., May 11-12.

New Jersey Utilities Association
Annual Spring Conference, Seaview Country Club, Absecon, N. J., May 12.

Pacific Coast Electrical Association
Annual Convention, Mapes Hotel, Reno, Nev., May 31-June 2.

* **National Association of Electrical Distributors**
Annual Convention, Convention Hall, Atlantic City, N. J., June 12-16.

* **Canadian Electrical Association**
Annual Convention, Manoir Richelieu, Murray Bay, Que., Canada, June 15-19.

* Addition This Week.

December Energy Sales Up 2.3% over Past Year

Electric energy sales rose in December as compared to the corresponding period of 1948.

Sales to ultimate customers totaled 21,951,177,000 kwhr, a 2.3% increase over the 21,465,106,000 kwhr sold in December, 1948. Revenues from ultimate customers amounted to $410,417,000, or 5.2% above the $390,128,300 received in December, 1948.

For the 12 months ended Dec 31 average use per residential customer was 1,684 kwhr, or 7.7% above the 1,563 recorded the previous year. The average annual bill rose 5.6%, from $47.05 to $49.68, and revenue per kwhr fell 2%, from 3.01¢ to 2.95¢.

Classification of Sales, December

Kilowatt Sales December	Million Kwhr 1949	Million Kwhr 1948	Percent Change
Residential or domestic	5,600	4,959	+12.9
Rural (Distinct rural rates)	506	472	+ 7.2
Commercial or industrial			
Small light & power	4,048	3,823	+ 5.9
Large light & power	10,319	10,720	— 3.7
Street and highway lighting	291	270	+ 7.8
Other public authorities	580	557	+ 4.0
Railways and railroads			
Street and interurban	334	374	—10.8
Electrified steam railroads	222	238	— 7.0
Interdepartmental	52	53	+ 0.1
	21,951	21,465	+ 2.3

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Anchorage, Alaska, Co-op Given G&T Loan by REA

Rural Electrification Administration's newest generating and transmission loan will go for construction of a power plant and lines in Alaska's Matanuska Valley in the area of Anchorage.

REA on March 3 approved a $5,289,000 loan to the Chugach Electric Association of Anchorage for generating, transmission, and distribution facilities. At the same time, REA also okayed $255,000 for the Matanuska Electric Association, Palmer, which will build a distribution line and various other facilities.

Major portion of the loan to Chugach will finance the co-op's share of the cost of an 11,200-kw generating plant which is to be built jointly with the Alaska Railroad. The railroad had planned the plant independently and ordered two 600-kw and one 500-kw diesel units and a 500-kw steam turbine. The co-op will now finance additional capacity in the form of three 3,000-kw steam turbine generating units.

The plant will supply 2,000 kw required by the railroad, 6,900 kw for the two co-ops in the area and also provide steam for the railroad shops and heating for the railroad buildings.

Alaska Railroad will operate the plant, which will be located on its property, and it will lease ground to the co-op for its substation site.

The new loan to Chugach is in addition to $560,000 approved two years ago for lines now under construction.

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Will Modernize Plant

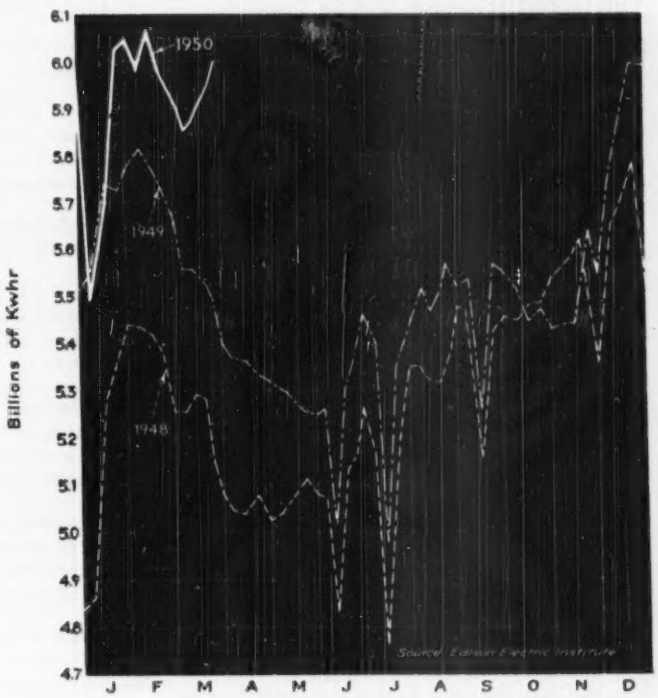
The British Columbia Electric Railway Co will modernize its No. 1 Plant at Lake Buntzen and increase its capacity from 28,000 hp in seven units to 72,000 hp in one. Some of the units were installed in 1903. The all-hydro plant will be used for peaking purposes during the winter season.

Decision Allowing PUD's to Buy Utility Appealed

Decision of the Thurston County Superior Court at Olympia, Wash., in upholding validity of a 1949 law authorizing PUD's to take joint action in purchase of the Puget Sound Power & Light Co has been appealed to the State Supreme Court by the Casco Co of Olympia, which filed the original suit.

Both the PUD's and the company said they welcomed the appeal action in order that a final judicial decision might be obtained, perhaps during May. Sale of the company is expected to follow closely the Supreme Court decision as buyer and seller are reported in substantial agreement on terms.

The law under challenge also provides for establishment of a state power commission.



Output Week Ended March 18—6,015,327 Kwhr

Weekly Output, Millions Kwhr

1950	1949	1948
Mar 18 6,015	Mar 19 5,496	Mar 20 5,145
Mar 11 5,937	Mar 12 5,531	Mar 13 5,285
Mar 4 5,879	Mar 5 5,552	Mar 6 5,293
Feb 25 5,854	Feb 26 5,559	Feb 28 5,252
Feb 18 5,931	Feb 19 5,650	Feb 21 5,254
Feb 11 5,971	Feb 12 5,722	Feb 14 5,385
Feb 4 6,063	Feb 5 5,778	Feb 7 5,412
Jan 28 5,972	Jan 29 5,810	Jan 31 5,429
Jan 21 6,041	Jan 22 5,769	Jan 24 5,436
Jan 14 6,029	Jan 15 5,727	Jan 17 5,370
Jan 7 5,695	Jan 8 5,742	Jan 10 5,278

Percent Change from Previous Year

	Mar 18	Mar 11	Mar 4
New England	+12.9	+14.2	+15.6
Mid-Atlantic	+ 6.7	+ 6.0	+ 5.8
Central Industrial	+ 7.1	+ 3.0	— 0.9
West Central	+ 8.9	+ 8.1	+ 8.1
Southeast	+12.1	+ 9.3	+10.4
South Central	+11.4	+10.5	+10.1
Rocky Mountain	+ 8.9	+ 9.6	+ 8.0
Pacific Coast	+12.9	+10.5	+ 6.8
Total United States	+ 9.5	+ 7.3	+ 5.9

WASHINGTON COMMENT

RONALD D. ROSS

THE ELECTRIC UTILITY industry is being asked for its views on federal water policy. President Truman's Water Resources Policy Commission has written to both the Edison Electric Institute and the National Association of Electric Companies inviting them to present industry's thinking on this important topic.

The invitation came a bit belatedly. Neither the industry nor its organizations were on any of the lists of public and private organizations and individuals to which WRPC first rushed letters seeking opinions and suggestions. This was despite the fact that the industry has an obviously high stake in federal water policy and the findings of the commission.

But, in fairness to WRPC, it should be noted that the job which the President assigned the seven-man commission is tremendous. WRPC is expected to come up with answers to most of the multitude of economic, scientific, and political problems related to national water policy. In addition, it has only until next Dec 1 to do so.

So the commissioners are on the home stretch right now although they've had only three meetings and barely met one another.

So far, it's pretty much a two-man operation. The members who have set up shop and are operating a busy office are two of the best known to the industry.

Chairman Morris L. Cooke, first administrator of REA and an ardent crusader for a Missouri Valley Authority, now asserts that an important part of his job is keeping an open mind on the controversial subject of river basin development. This statement, however, has not entirely calmed the fears of valley authority foes.

Other full-time member these days is Commissioner Leland Olds, who is in charge of studies. For Olds, WRPC is the next thing to the Federal Power Commission, literally as well as figuratively. WRPC offices are next door to FPC quarters in Washington.

Cooke and Olds are likely to continue to dominate the picture for several months. Four of the other five members are college officials, who will have more time to devote to the commission after the present school year ends. Meanwhile, they are being deluged by material on water problems, sent them by their colleagues from the Washington headquarters. Most of the staff which will advise WRPC is being recruited from government departments, which are lending personnel for various periods.

It all adds up to a pretty unsympathetic audience for the statement of the electric utility industry. Even at best, the industry must expect that its views will not be major factors in WRPC's recommendations on the controversial water power issues.

On the other hand, a clear statement from the industry of how a sound federal water power policy can be shaped to encourage progressive development in cooperation with the electric power business is essential. It should be available in the deliberations of the commission and for the important record which WRPC will compile in making its findings.

If the industry doesn't speak out, WRPC's net effect, power-wise, may well be simply a new presentation of views of the public power planners.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Network protectors operate on faults about one-seventh as often as on normal switching and testing; the corresponding failures to operate properly are in about the same proportion—once in 600 operations.

Heat transfer in a condenser was increased in one typical instance from 78% to 92% by acid cleaning.

Flyash in the proportions of 10 parts with 90 parts of portland cement would consume the total utility stack production, because about 150 million barrels of cement are used annually in the areas where coal is burned.

Dust collectors are judged better by what escapes them than by what they extract from the stack gases.

Meter test blocks and enclosures should logically have the terminals arranged in the same sequence as the meter's own terminal block. If accepted, then is the repetition inescapable?

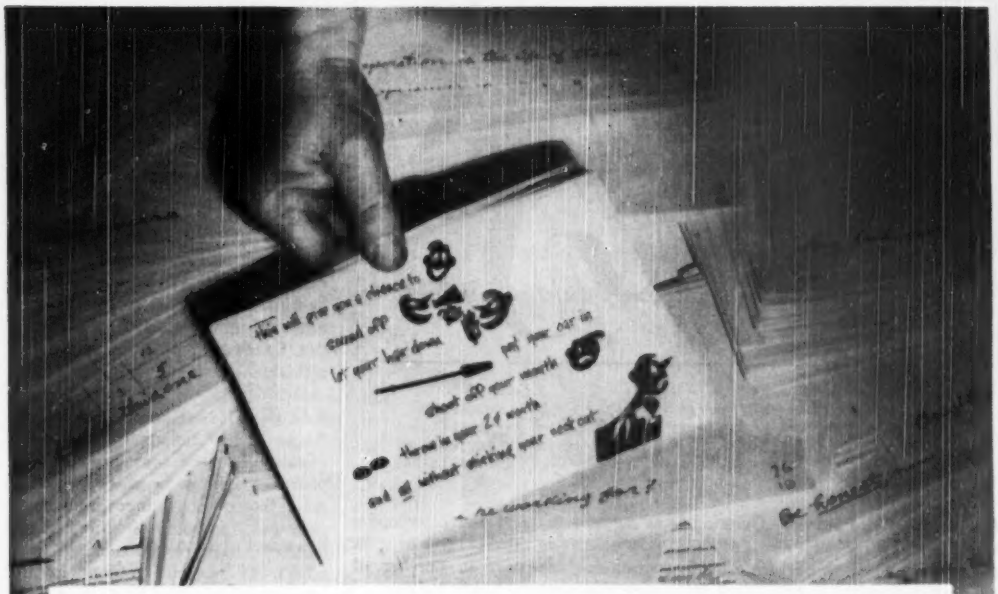
Coal piles will not catch fire if the coal is compacted to 70 lb per cu ft even if the pile is 100 ft high. Variation in source (even 60 mines) and volatile content (even 17 to 37%) make no difference.

Possible cable injury is a matter of concern (in the absence of adequate trustworthy knowledge) if one suddenly has to carry the load previously shared comfortably with another in parallel.

Insulation in generators cannot practicably equal for impulse voltages what can be built into transformers. The deficiency can, however, be offset by using: (1) arresters to limit the peak value of the surge, and (2) capacitors to slow down its rate of rise.

Silicon steels now present about half the loss they did only 10 years ago.

Overhauling a turbine takes less overall time if the dismantling is done rapidly to disclose any unexpected difficulties and allow ample time for rectifying the conditions.



Let's Look at Load Building

Secure in anonymity, 81 sales heads say what they think

POWER COMPANY sales departments are undermanned. The level of competence of their personnels is not as high as it should be. Neither is their enthusiasm.

This is the principal impression retained by the editor after his labor on the survey replies detailed on the following pages. The survey was made to find out how power company sales executives felt about their jobs. It was limited to power companies because they, as distinct from the generality of other suppliers of electricity, are sellers of their service, or are supposed to be.

In order to encourage free and candid expression the survey was hedged about with precautions to assure the anonymity of repliers. The editor speaks the literal truth in saying that he can not identify any reply. Nor can anyone else, except a replier his own. Thus the results of the survey may be accepted as about the most honest statement possible of opinions and attitudes of sales heads in respect to the problems that today confront them.

The survey results have the validity of large representation of the field covered. Questionnaires were sent to 189 people. In time for compilation, 81 replies were received. Since then 7 more have come in. All together they represent nearly 50% of the companies addressed, over 25% of all power companies in the country. If the late replies could have been worked into the compilation, the figures on the following pages would be different. But the conclusions from them would not be changed.

Summing It All Up

Coverage of the Survey Questionnaires were sent to sales heads of 189 power companies, those with 25,000 or more customers. Returns were received from 80, 42%. Returns fall into 3 groups—companies with less than 100,000 customers, 35, 41%; 100,000-500,000, 38, 48%; over 500,000, 7, 88%.

Range and Water Heater Subsidies About 27% of the replies stated some kind of subsidization of ranges and water heaters.

Whither Load Building? Lack of knowledge for direction of load building activity is admitted in 13 replies and is implied in 24 more that are unresponsive on this point. Some 53 replies report load studies more or less complete. Ranges, water heaters and lighting, in that order, are rated highest as contributors to net return.

Pros and Cons of Merchandising Strongly evident among the 54 replies from merchandising companies is belief that dealer sales alone are not an effective load builder and that direct selling is a better stimulant of dealer sales than dealer co-operation by itself. Profit from appliance sales does not seem to be a major reason for utility merchandising.

Adequacy of Sales Forces Only in industrial sales do the power companies appear to be adequately manned. In residential sales they have about one half as many people as needed, in farm and commercial sales about two thirds. Ideas of what constitutes adequacy in number of sales personnel are widely various.

Deficiencies in Sales Forces Nearly 75% of the replies reported deficiencies in numbers and competence of sale forces. About 20% reported refusal of authorization to hire more.

The Cost of Selling Today About 60% of the replies say that departmental cost is no deterrent to development of an adequate sales staff.

Electrical Leagues No leagues or like organizations exist in the service areas represented by some 60% of the replies.

Dealer Co-operation Effort, much or little, towards co-operation with electrical dealers is reported by 90% of the replies. Co-operation with plumbers is less, about 50%.

Load Increase, Aided and Unaided Opinion in over 90% of replies is that unaided load growth will not be sufficient to produce required earnings. This opinion is shared by most managements.

House Heating Except in a few instances, no immediate concern with house heating is apparent among the replies.

Combination Utilities That electric system load development is restricted by concern for gas investment is the opinion expressed in 63% of replies.

Sales Cost vs Revenue Most general proportion of sales expense to gross revenue is 2%. Range is from 5% down to less than one. In EAR, range is from 70¢ per dollar down to 12¢.

National Sales Activities Practically all replies say that a good job is being done by trade associations in national organization of sales activities. Large use is being made of sales aids thus provided.

Additional National Promotions About half of the replies offer suggestions for additions to, and improvement of, national sales activities. Suggestions range from new programs on home lighting, home laundry, commercial cooking and others, to seasonal promotions in present activities and more manufacturer co-operation in them.

Emphasis in Promotion First, second and third emphases are on ranges, water heaters and lighting in residential load building; first and second on lighting and cooking in commercial; first on domestic appliances in farm; first on help in production problems in industrial.

Engineers' Objections About 75% of replies report no objections to load building activities from distribution engineers. Loads of high demand and low load factor are causes of most friction.

Three-Phase Service Over half of the replies report customer contribution in one way or another for 3-ph service in single-phase areas. But this is not generally seen as an obstacle to load building.

Rates and Service Rules Approximately 20% of replies indicate that rate changes would facilitate load building and about the same proportion say the same about service rules.

Soul-searching Question Over half of the replies say that their sales enthusiasm is as high as ever, about 6% dodge the question, and about 40% admit a let-down more or less.

Here Are the Questions We Asked Here Are The Answers

Replies indicate wide diversity of thinking among sales executives as to selling policies, promotion methods and personnel requirements

An easy one to start with

First, so that we may arrange replies in approximate order, we should have some idea of the size of the system which is represented by your response. Therefore, please check one of the following: Less than 100,000 customers; 100,000 to 500,000 customers; over 500,000 customers.

THE SURVEY questionnaire was sent to the sales heads of 189 power companies. Returns were received from 80, 42%, in time to be included in this summary of replies. Another return came from the sales sponsor of a service company. (Copies of the questionnaire were sent to several service company men to inform them of what was going on. They were invited to fill it in if they wished.) Since this service company represents a group of operating utilities with generally the same sales policies it has been included in the analysis of replies.

It was decided to confine the survey generally to companies with 25,000 or more customers. Reason for this was that in companies below this limit duties of personnel often overlap and it is difficult to separate sales functions from other work. A meter reader or a division manager, for instance, may also be a salesman.

A few questionnaires were sent to companies with just under 25,000 customers whose sales heads were personally known to the editor to be enterprising operators.

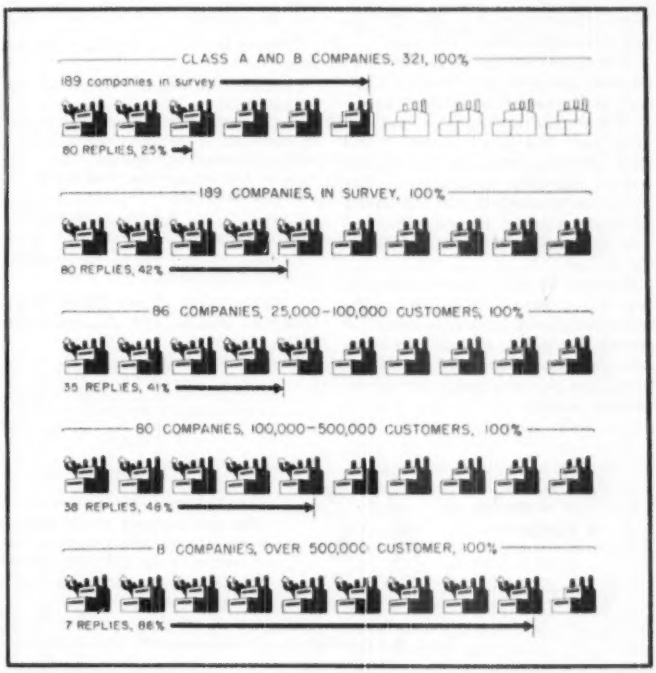
There are 174 companies with 25,000 or more customers listed in the latest (1948) *Statistics of Electric Utilities in the United States*, published by the Federal Power Commission. The 80 returns from operating companies thus can be taken to represent the top sales thinking of about 46% of the so-called "private" electric utilities with 25,000 or more customers each, and 25% of the total 321 such utilities.

Replies were received from 35 companies of less than 100,000 customers. In the 25,000-100,000 customer group are 86 companies. The returns thus represent about 40% of this group.

From companies of 100,000-500,000 customers, 38 replies were received. Such companies number 80 according to FPC, making the response about 48%.

From the largest systems there came 7 returns. The proportion of replies against the number of these companies, 8, is 88%.

The percentages of replies in the 3 company groups is quite high. They are evidence that the information stated, the opinions expressed, and the attitudes disclosed may be taken as representative of the "private" utilities.


CLASS A AND B COMPANIES, 321, 100%
189 companies in survey
80 REPLIES, 25%
189 COMPANIES, IN SURVEY, 100%
80 REPLIES, 42%
86 COMPANIES, 25,000-100,000 CUSTOMERS, 100%
35 REPLIES, 41%
80 COMPANIES, 100,000-500,000 CUSTOMERS, 100%
38 REPLIES, 48%
8 COMPANIES, OVER 500,000 CUSTOMER, 100%
7 REPLIES, 88%

SURVEY REPRESENTS impressive cross-section of power companies, mostly over 25,000 customers, returns representing top sales thinking of about 46% of such private utilities

A helping hand

Does your company subsidize installation of ranges and water heaters: By paying part of wiring cost? How much? By allowances to plumbers, dealers or distributors? How much?

NO SUBSIDIES were reported in 59 of the 81 replies. Of the 59 "No's", 45 were without comment. Of the 14 remaining, 4 indicated consideration of the idea:

"Wish we did, but top management says 'no'."

"Planning to soon. How much—$15, $20?"

"No subsidy as yet. It may come!"

"We could change our mind if subsidies seem to be needed to get business."

The idea that money used for installation subsidies could be better employed is expressed in 3 replies:

"Subsidies are helping hand, but a deadening one because they emphasize price consciousness. Ranges and water heaters have to be sold creatively. We lend our helping hand that way."

"The same amount of money spent for sales manpower produces more revenue and accomplishes greater good."

"We do not buy business, but will work hard and spend money to sell need, believing that if this is sold dealers can sell merchandise. This policy has resulted also in our having the lowest rates of any non-subsidized —ie, tax-paying vs tax-free—utility in our region."

Practices by which power companies bear all or part of range and water heater installation costs are various and are not amendable to summary statement. Those stated in the 22 affirmative replies are presented in the accompanying panel.

Wiring Subsidy Practices

Company A—Pay all wiring costs on ranges sold by dealers and by company, also on ranges owned by new customers moving into service area. Ranges moved once free of charge, thereafter $20 per move. Similar plan for water heaters.

Company B—Pay approximately 60% of wiring cost.

Company C—On ranges, all cost of enlarging service entrance up to $35 per dwelling unit.

Company D—Pay $20 on range and water heater wiring. (On the question of allowances to dealers, plumbers or distributors, the reply is, "None. We tried this. It stinks!")

Company E—All cost over $25 on ranges only.

Company F—Company installs service entrance facilities in standard cases at no cost to customer. Wiring circuit cost paid by customer. If company installs circuit wiring, customer is billed on a flat rate basis of $15 for a range, and $10 for a water heater circuit.

Company G — Furnishes combination meter box and entrance switch.

Company H—Pay $28 on cost of range or water heater wiring.

Company I—Pay all over $20 for range connection and all over $15 for water heater connection.

Company J—Pay first $20.

Company K—Pay $35 for range and $22.50 for water heater wiring. Also $18 for water heater plumbing.

Company L—Pay $15 on range or water heater wiring.

Company M—Pay up to $25 for range and to $20 for water heater wiring.

Company N—For existing houses, pay $25 on range, and $10 on water heater, wiring. New houses, range and water heater wiring, each $10.

Company O—Install water heaters, 50-gal or larger, without charge to residence customer; includes wiring and plumbing.

Company P—Pay $15 towards change from 2-w to 3-w service. Money is paid to dealer who has secured certificate from customer that the money has been credited on cost of changing service.

Company Q—Incentive plan being developed to pay $10 maximum on range wiring, $20 top on water heater. Company already installs 3-w service and switch at no cost to customer.

Company R—Ranges, yes. Water heaters, no. All material furnished without charge. Customer pays $12.50 for labor.

Company S—20% of cost.

Company T—Pay $20 to distributor for each range or water heater installed.

Company U—Ranges only. $20 to dealer.

Company V—Company pays all over $10.

This may be a toughie

Do you know definitely where you are going in load building activities?

Has your company's present load been investigated and studied so that you know what contributions to net are made by different customer classes and by different appliances and other utilization devices?

In short, are you building load on hunch or on knowledge of how much of what and when and where new load is most to be desired?

If you have such studies how are the loads of the various appliances and devices roughly classified? Loads that contribute to net—Loads promoted that do not contribute—Loads discouraged.

TO THE FIRST question above there were received 20 replies saying "Yes" or equivalent. "Think so," "Believe so," or "Approximately" are the responses of 13 more. Another has a question mark after the "Yes" and 2 others add the words "but not when" and "we hope." Direct reply to the query is lacking in 8 replies, but contain statements that indicate the knowledge noted in the question. Thus it may be concluded that of the 81 sales heads responding in the survey 44 say they know or think they know where they are going in load building activities.

"No" is the reply of 13. A fourteenth asks, "Who does?" and a fifteenth says he is feeling his way. The remaining 22 replies are not responsive to the question.

Affirmative replies to the question on load studies number 30. Studies now being made are reported by three. There are 20 more replies that probably should be classed as "Yes," although many of them seem to be rather lukewarm—"In general"—"Partly"—"Hard to get two engineers to agree"—"Results are usually questioned"—"Wish there were some way

to study this and be sure the answers are right. We hope ours are"—"Not as good as would be nice to have, but fair"—"Not on an accurate basis"—"Very superficially"—"In a limited way"—"Not completely"—"Few and approximate"—"Not in detail."

Negative replies to this question came from 16 sales heads, of whom two say that lack of capacity is the reason. The remaining 12 replies are not responsive.

To the question as to hunch or knowledge in building load 34 replies make no direct committal. One reply comes right out and says "Hunch." It stands alone. But near it are a lot of others. Closest are 7 that say, "Mostly on hunch except low use," "50/50." "Neither," and "Partially." Next come a couple, "Think our ideas are good enough without surveys" and "I think I know but company does not agree." Philosophy of eight is to take what they can get with or without promotion.

Some did not observe that the question presented a choice, could not be answered "Yes" or "No." But 9 replied that way and no one knows where they stand. That leaves 20 who assert they are building load on knowledge, but one of them confesses his knowledge extends only to residential load building.

No information on the last item of the question is contained in 30 of the replies. Of the other 51, compilable information is given by 45 and is presented in the accompanying panel. The remaining 6 include 2 that say rates should be designed to make all loads compensatory. Another pair reports that no loads are discouraged, but that those contributing to net are emphasized. The fifth brings in another consideration, "We will serve everyone with an adequate supply of power for any and all purposes. This policy annoys our enemies who are promoting "public power" no end. Therefore we believe it is right and may keep us from being socialized."

Points mentioned in connection with loads not considered as contributing to net return are their value in respect to customer relations and to facilitating sale of compensatory loads.

Comparative Values of Loads
(Numbers are of mentions in replies)

PROMOTED AS CONTRIBUTING TO NET RETURN

Ranges	28	Dishwashers	4
Water heating	25	Attic fans	4
Lighting	21	Small appliances	3
Refrigeration	19	Ironers	2
Bed coverings	11	Radio	2
Commercial Cooking	9	Television	2
Home freezers	9	House heating	2
Clothes Dryer	9	Automatic washers	2
Farm uses	8	Disposers	1
Industrial heating	5	Home laundry	1
Air conditioning	5	Roasters	1
Street lighting	1		

PROMOTED, BUT NOT CONTRIBUTING TO NET RETURN

Air conditioning	6	Welding	2
Water Heating	6	Disposers	1
Ranges (alone)	4	Home laundry	1
Street lighting	2	Automatic washers	1
Dishwashers	2	Irrigation	1

DISCOURAGED

(One reply changed this to "Not encouraged by promotion")

House heating	24
Air conditioning	4
Clothes dryers	3
Water heating	3*
Television	2*
Welders	1
Large industrial	1*
Saw mills	1
X-Ray machines	1

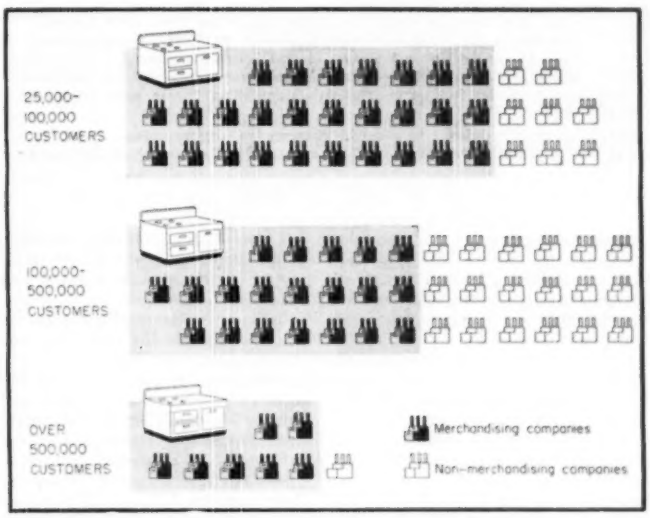
*Special local conditions, unrelated to load value, are causal factors here.

Speak up, laddies

Does your company merchandise all appliances, major appliances only, or none at all?

If the company does merchandise, is it because of belief that: Dealer sales alone are not an effective load builder? Dealer cooperation is not as good a stimulant of dealer sales as company leadership in merchandising? Merchandising profit is worth going after?

If your company does not merchandise, do you expect that it will do so in the near future: On major appliances only? On all appliances?



DIRECT SELLING of appliances seems more prevalent among small and large utilities than among medium-size ones, and less than 25% mentioned profit as a reason for direct selling

OF THE 54 COMPANIES reporting direct merchandising, 37 sell all appliances (exceptions of radio, television and clocks in 3 cases), 14 sell only major devices, and 3 sell small appliances only. Convenience to customers is given as the reason in one case of small appliances only. In another—"So as to keep a foot in the door if we need to go into aggressive merchandise operation." Merchandising in small towns only was reported by 2 of the 54 companies.

Strongly evident among the 54 replies is lack of faith in dealer sales alone as a load builder, 35 in specific agreement on that point. That utility leadership in merchandising is a better stimulant to dealer sales than dealer cooperation is the opinion stated 36 times. Several replies noted that the two go together. General observation is that this is prevalent practice and if the question had been differently phrased, that point would undoubtedly have been brought out more definitely.

Pertinent here is one reply:

"This question needs some qualifica-

tion. Dealer cooperation as a stimulant to dealer sales can be good, but in such case is very expensive compared to a combination of cooperation and merchandising. Especially dealers in rural areas either cannot afford adequate outside sales manpower for canvassing or do not have the ability or inclination for it."

Profit from appliance sales does not figure largely in power company thinking. Only 13 of the 54 merchandising utilities included that as one reason for direct selling. In a couple of replies it was indicated that the only reason for consideration of appliance sales profit is that it somewhat reduces the total cost of load building.

Here are some remarks from replies of merchandising companies:

"Dealer sales alone are not sufficient to build the load we want and expect without utility leadership in an aggressive merchandising program."

"Dealer sales are not an effective load builder, but they could be improved. Company should direct more promotion towards dealer sales. Selling major appliances only, there is no profit in merchandising, a loss, rather."

"Our company believes in merchandising for three reasons: (1) It builds load faster, (2) it helps maintain prices and quality of merchandise sold, (3) profit from appliance sales makes it possible to spend more money for promotion."

"We believe that our sales efforts develop several times as much business as we get the orders for. Hence, from the load building angle, we get all the appliance load the dealers would have sold without us, plus the sales we have created for dealers, plus what we sell ourselves. We believe this is more than dealers would sell with our cooperation but without our direct selling."

Over against the attitude disclosed by the above quotations is a single contrary expression:

"At present this company merchandises major gas and electric appliances. Management is now considering a new sales promotion program wherein the company will discontinue active sale of appliances and concentrate on dealer promotion."

Of the 27 replies from non-merchandising companies, only 5 indicated intention of going into direct selling of appliances in the near future. A sixth, while disclaiming any immediate intention of doing so, indicated some thought on the matter by saying that if and when merchandising were undertaken, all appliances would be sold.

One company, a combination utility that sells all gas appliances because dealer sales are not an effective load builder and dealer cooperation is not as good a stimulant of dealer sales as company leadership in merchandising, stays out of electric appliance merchandising because:

"We find that our dealer cooperative sales program has been very helpful in improving customer and public relations. In the 4 years since the war, our dealers have done an outstanding job of merchandising, having sold an average of 25 major appliances per 100 domestic customers each year since 1945. In two areas, dealers headed citizens' committees that beat elections for public power. This alone is good reason for cooperating with dealers, who are an important part of our American system of free enterprises."

Of the 5 companies that will or may start merchandising in the near future, 2 state they will sell major appliances only, one of them saying that, "Dealers will not do a satisfactory job on ranges and water heaters unless highly subsidized by the utility."

It is interesting to note from the replies that gas and electric service combined in one utility seems to have no bearing on whether or not a company merchandises. Among those who sell appliances the straight electric and combination utilities are about evenly divided, 22 of the former, 25 of the latter. There are 18 straight electrics and 7 combinations who do not sell.

Gotta *figure* this one

Are your sales forces adequate?

You have a certain number of people—outside and inside sales personnel, home service girls, home economists, application specialists, engineers, contact men, etc—working in each branch of load building, residential, farm, commercial and industrial. Ratios of customers per person so employed are significant figures for comparing companies as regards sales and promotional activities. Please enter ratios for your company in the form below.

[To conserve space, form is omitted here. It asked for customers per person employed in residential, farm, commercial, and industrial load building in 1940, now, and "What you think the figure should be."]

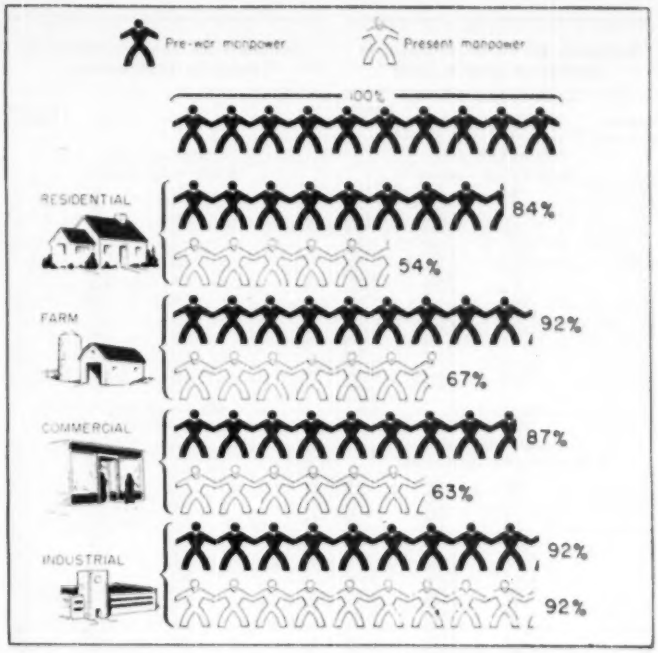
"No", replied 9 sales heads to the direct question above. Their answer is paralleled by the general condition in the industry according to the data collected by this question. The data were tabulated in detail in order to show the variety and the wide divergence of ideas of manpower required to do the load building job.

In non-merchandising companies, present manpower varies from a high of one person for every 1,200 residential customers to a low of one for every 29,000. These companies think they should have one person in residential load building for numbers of customers ranging from 1,718 to 8,500. The averages for the group say that at present these companies have little more than half as many people working in residential load building as before the war and less than a third as many as necessary to do a good job.

Merchandising companies naturally have larger residential sales forces than do non-merchandising. This difference is clearly apparent in the data. Present personnel ranges from one for every 625 customers to one for every 23,000. Desirable number of customers per person employed shows wide variation also, from 650 to 8,000. The averages for this group are not so strikingly divergent as for the non-merchandising, but they say again that residential load building manpower is now considerably less than pre-war and much less than what it should be.

Taking together all 51 replies that contained comparable data, the conclusion from their over-all averages is that the industry has only about one half as many people now employed in residential load building as are needed. Some replies gave numbers of personnel instead of customers per person. These are also tabulated. They, too, show a present deficiency of personnel, but not so striking, probably because of their small number.

In farm load building the situation



RESIDENTIAL load building personnel is only a little over one half what is desirable. In farm and commercial the condition is somewhat better but still far from the optimum. In industrial, the situation is about right. This of course is the over-all picture

is the same, although the difference between present manpower and what is desired is not so great. The small companies seem less well manned than the larger ones. Here again the ideas of what constitutes adequate personnel are at large variance, ranging from one man per 475 customers to one per 6,000. The over-all averages show that the industry would like to have about as many men as before the war. One reply gave a ratio of one man per 40,649 customers at present and 40,000 as desirable. This is not included in the tabulation because it would distort the averages too much.

For commercial load building, more men are required than pre-war, according to the over-all averages. The large companies apparently have a better idea of the manpower required in the field than do the medium and small ones, judging from the group averages of present personnel. But in respect of desired manpower, it seems that the medium companies have a stronger appreciation of the value of commercial load development. Here also is the characteristic variance of ideas of required personnel; at the top is one company that thinks there should be one man for every 250 customers and at the bottom another thinks that one man per 3,000 customers is sufficient.

It is obvious that all of the tabulated data here presented must be taken as an indication of the manpower situation in load building rather than as an exact quantitative statement of it. This fact is more plainly apparent in the table of customers per person employed in industrial load building than in the others. The ranges in ideas of required personnel are comparatively much greater. At the top is one man for every 30 customers and at the bottom is one for every 1,000. There was one reply, not included in the table because it also would distort the averages too much, that reported one man for every 2,000 customers. There are certainly many more factors in the industrial load building picture than are included in mere figures of customers per man employed. But it does not seem that giving even the greatest weight to these factors would justify the difference between 30 and 2,000 customers per man, a range of 1 to 67.

The over-all averages of this table and the group averages also, indicate that in general present power sales personnel is quite close to what is considered adequate despite the wide differences in opinion of what constitutes adequacy.

Customers per Person Employed in Residential Load Building

Company	1940	Now	Desirable Number
NON-MERCHANDISING COMPANIES (25,000-100,000 Customers)			
1	900	1,900	.....
2	.....	3,000	3,000
3	12,000	6,000	3,000
4	12,000	7,500	5,000
5	2,800	10,000	2,500
Avg.	6,925	5,540	3,375
MERCHANDISING COMPANIES (25,000-100,000 Customers)			
6	560	625	650
7	629	1,266	.....
8	1,200	1,500	850
9	1,600	1,770	1,770
10	1,660	1,900	1,000
11	2,000	2,400	1,500
12	.....	2,570	2,570
13	2,500	2,600	2,750
14	950	2,800	2,000
15	.....	3,000	2,000
16	1,300	3,210	1,500
17	2,000	5,000	2,000
18	10,000	5,000	4,000
19	1,800	5,500	1,500
20	6,500	5,600	5,000
21	2,481	5,808	2,500
22	.....	7,000	.....
23	18,000	23,000	5,000
Avg.	3,545	4,475	2,288
Group Avg.	4,257	4,706	2,505
NON-MERCHANDISING COMPANIES (100,000-500,000 Customers)			
24	670	1,718	1,718
25	1,500	2,700	2,000
26	2,796	3,827	3,500
27	1,130	7,000	1,800
28	12,000	7,500	5,000
29	2,500	8,000	5,000
30	1,400	8,300	8,500
31	5,920	16,900	5,000
32	.....	29,000	4,000
Avg.	3,289	9,461	4,058
MERCHANDISING COMPANIES (100,000-500,000 Customers)			
33	851	1,370	1,370
34	3,000	.....	3,000
35	1,171	1,508	1,000
36	1,500	1,800	1,500
37	.....	2,560	.....
38	1,000	2,950	2,500
39	2,800	3,500	3,000
40	2,300	3,630	.....
41	3,000	4,000	2,000
42	1,378	4,169	4,000
43	1,881	4,248	.....
44	2,100	4,900	2,500
Avg.	1,907	3,149	2,319
Group Avg.	2,574	5,999	3,188
NON-MERCHANDISING COMPANIES (Over 500,000 Customers)			
45	5,000	18,000	4,000
MERCHANDISING COMPANIES (Over 500,000 Customers)			
46	1,500	2,500	2,000
47	1,500	3,000	2,000
48	1,800	3,000	2,500
49	1,711	3,253	.....
50	8,100	8,600	8,000
51	2,500	4,000	2,000
Avg.	2,852	4,059	3,300
Group Avg.	3,265	6,050	3,417
N-M Co's Avg.	4,663	8,730	2,552
M Co's Avg.	2,852	3,987	2,465
Grand Avg.	3,452	5,408	2,909

To balance against the 9 "No" replies to the direct question, earlier mentioned, there are 7 that say, "Yes" or "Fair," or "I think so." Perhaps the situation is summed up in one of these affirmative replies:

"Have you got enough money? Is your wife perfect? The amount to be

Customers per Person Employed in Farm Load Building

Company	1940	Now	Desirable Number
	COMPANIES WITH 25,000-100,000 Customers		
1	.....	475	475
2	1,000	1,000	1,000
3	801	1,031	1,050
4	1,000	2,000	700
5	.....	2,000	1,500
6	1,400	2,000	1,500
7	2,000	2,000	.....
8	.....	2,274	2,274
9	.....	3,000	1,500
10	.....	3,600	3,600
11	.....	6,000	6,000
12	3,008	8,134	2,000
Avg	1,535	2,793	1,964
	COMPANIES WITH 100,000-500,000 CUSTOMERS		
13	.....	570	.....
14	.....	1,050	850
15	912	1,139	1,200
16	1,300	903	903
17	.....	1,138	1,138
18	1,500	1,500	1,000
19	632	1,498	.....
20	2,000	1,500	1,900
21	1,530	1,660	1,600
22	958	1,716	1,000
23	1,800	1,800	1,800
24	2,000	1,900	1,600
25	6,000	2,160	1,500
26	1,600	2,250	2,250
27	4,000	2,500	2,000
28	1,240	2,600	2,000
29	2,210	3,060	2,000
30	1,000	5,000	1,000
31	3,000	5,000	2,000
32	.....	9,000	2,500
Avg	1,980	2,382	1,530
	COMPANIES WITH OVER 500,000 CUSTOMERS		
33	1,100	1,100	1,000
34	2,000	2,000	2,000
35	870	2,700	2,000
36	1,500	3,000	1,500
37	1,000	5,000	3,000
Avg	1,292	2,760	1,900
Grand Avg	1,865	2,566	1,710

Customers per Person Employed in Commercial Load Building

Company	1940	Now	Desirable Number
	COMPANIES WITH 25,000-100,000 Customers		
1	500	580	500
2	600	600	.....
3	.....	1,000	1,000
4	700	1,000	700
5	1,000	1,000	1,000
6	1,000	1,000	1,000
7	703	1,491	1,500
8	1,500	1,930	1,930
9	1,000	1,900	1,000
10	514	1,609	800
11	3,000	2,000	.....
12	2,098	2,281	1,000
13	2,334	3,149	1,000
14	.....	3,417	3,417
15	3,743	4,398	1,000
16	3,500	5,243	2,500
17	.....	12,000	3,000
18	.....	.....	3,000
19	2,500	.....	2,000
Avg	1,646	2,571	1,491
	COMPANIES WITH 100,000-500,000 CUSTOMERS		
20	1,000	800	800
21	742	881	900
22	331	979	.....
23	543	994	994
24	1,000	1,000	1,000
25	1,860	1,180	1,180
26	1,000	1,300	1,000
27	.....	1,415	.....
28	1,330	1,490	1,350
29	1,000	1,500	1,500
30	825	1,650	1,650
31	1,660	1,940	1,500
32	1,060	2,000	1,000
33	1,235	2,184	1,500
34	2,380	2,250	2,000
35	.....	2,343	1,000
36	1,583	2,468	1,500
37	5,000	2,800	1,500
38	2,400	3,500	1,500
39	.....	5,000	1,000
40	3,000	5,000	1,000
Avg	1,585	2,028	1,256
	COMPANIES WITH OVER 500,000 CUSTOMERS		
41	260	357	250
42	1,250	1,500	1,000
43	2,700	1,850	1,850
44	1,000	2,000	1,000
45	2,700	2,800	2,700
Avg	1,582	1,641	1,360
Grand Avg	1,599	2,198	1,391

Customers per Person Employed in Industrial Load Building

Company	1940	Now	Desirable Number
	COMPANIES WITH 25,000-100,000 Customers		
1	30	30	30
2	70	68	70
3	60	70	90
4	70	76	76
5	.....	84	84
6	63	87	60
7	100	100	100
8	250	115	.....
9	.....	128	128
10	80	130	80
11	400	150	150
12	200	150	150
13	200	200	.....
14	149	210	210
15	600	500	500
16	188	572	575
Avg	175	167	165
	COMPANIES WITH 100,000-500,000 CUSTOMERS		
17	29	29	30
18	43	45	45
19	100	100	100
20	56	100	100
21	88	113	100
22	140	120	138
23	123	127	.....
24	95	135	135
25	100	170	150
26	200	200	150
27	200	200	200
28	860	205	205
29	159	225	200
30	173	279	279
31	.....	350	100
32	201	400	200
33	400	400	400
34	304	411	400
35	1,000	1,000	750
36	1,000	1,000	1,000
37	1,000	1,000	1,000
Avg	314	315	284
	COMPANIES WITH OVER 500,000 CUSTOMERS		
38	40	45	40
39	55	85	75
40	110	105	100
41	121	117	117
42	125	240	125
Avg	90	118	91
Grand Avg	235	235	216

spent on sales activity is a compromise, naturally. We feel we are spending a reasonable amount and have adequate personnel, but not all we would like to have."

Discussion of the responses to this question on sales personnel should not close without mention of 3 replies that reported no sales forces at all. One of these is from a company in the group having 100,000-500,000 customers; the other two responses are in the small company class.

Look your gang over

If you think the present personnel of your department is not adequate in number or competence for the load building job you see ahead: What are the outstanding deficiences? Have you asked for and been refused authorizations to hire more people? When and how often?

OPINION that their sales organizations are adequate in number and competence is expressed in 21 replies. Contrary minded are 57 replies and 3 did not respond. Of the 21 replies stating adequacy, 7 include qualification, "at present," stating or implying that expansion would be necessary when available generating capacity required load building or when promotional plans were decided upon. On this point, "Basic trouble is company cannot make up its mind on sales policy," said one reply.

Insufficient number of personnel is reported in 39 replies, lack of competence in 11, and both deficiencies in 7. Lack of training is specifically mentioned in 10 replies and is implied in 6 more that speak of the difficulty of finding competent people. Several note the apparent unwillingness of people to work at selling and others refer to the age of present employees. It is quite impossible to classify even roughly the various comments in the replies; instead their flavor is given in the accompanying selection of quotes from them.

To the question respecting refusal of authorization to hire more people, there are 33 "No" replies. Probably one of these should be put into the "Yes" column because it says, "Busy continually trying to sell management on present needs and on keeping the manpower we now have."

Affirmative replies number 16. To the "When and how often?" query—"Two or 3 times per year for the past 4 years"—"Yearly for last 3 years"—"For the past 18 months. Too frequent to record"—"Past 4 years"—"Once or twice each year"—"Several times per year"—"Many times"—"Repeatedly"—"Twice in 1949, once in 1948."

What's the Trouble? Well,—

"Too many too old. Need higher type in many cases."

"Lack of youth."

"Better and better-trained salesmen, rather than more salesmen."

"Not competent."

"It is most difficult to find either men or women who are willing to work as salespeople. It seems they all want the money, but do not have the energy, ambition and initiative to earn it."

"When good men can be found we'll add some here and there."

"Old men have only mediocre ability. Young men lack experience. No one hired during war and depression years and there is a great gap in the 32-42 age group."

"Hard to get our employees merchandising-minded."

"We have a big job in sales training of new employees and in retraining older ones to get sales efficiency up to the desired point."

"Desirable personnel are not readily available."

"Difficulty in securing suitable men."

"Difficult to get the right type."

"New Wage and Hour Regulations applying to utility sales personnel are most serious deterrent to their full effectiveness. Imagine any *salesman* figuring he can limit his hours to 40 per week, or that his compensation should be based on hours rather than on ability and results."

"The problem is continual education and training to keep sales force on its toes."

At present prices!

Has the cost of operation of your department, in higher salary and other expenses, deterred you from moving as far and as fast in developing an adequate sales organization as otherwise you might have?

PRESENT-DAY COSTS of sales department operation have not been a deterrent against developing an adequate sales organization, say 46 replies. Except perhaps in home service, remarks one of the 46. That costs have been a deterrent is reported by 20 replies. Of the remaining 15 replies 8 are not responsive on this point, 4 imply "Yes" to some degree, 2 say that lack of capacity rather than cost has been the hindrance, and one is worth quoting. "Don't think so. It is the personal objection (sincere) of some of company management that a sales organization is a waste of money."

Rather paradoxical to those who believe in the value of selling are a couple of replies:

"[Cost] certainly tends to hold us down especially in view of net earnings."

"Company is more interested in net, and is not of the opinion that sales effort will help net."

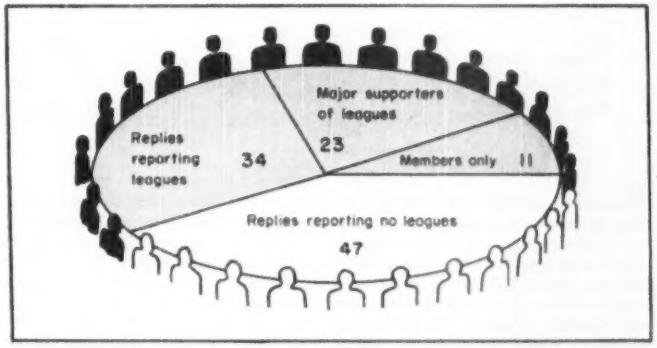
The Wage and Hour law is on the mind of one replier who is apprehensive of the effect on his payroll of time and a half after 40 hr, because good salesmen just have to work overtime. Another wants to get full value out of his present crew before he adds more men to it. And still another says that it is not possible to bring competent salesmen into the company with what he can pay.

Co-operation is the life of trade

Is there an electrical league in your territory and is your company affiliated with it: Simply as a member paying regular dues? Or as the major financial supporter of the league?

THERE ARE NO electrical leagues or other effective trade promotion organizations in the service areas of 47 companies reporting in the survey. Such organizations do exist in the areas of 34 responding companies. In 11 of these 34 cases, the companies are simply members paying regular dues. In 23 cases, the companies are the major financial supporters.

Of the 47 "no league" replies, 3 say the companies are taking steps to get leagues organized; 2 others report company members in associations outside company service areas; 3 report small local groups with company members or under company sponsorship; one says the company has tried to organize a league "but dealers are only order takers and won't cooperate."



ELECTRICAL LEAGUES or other promotion groups exist in territories of less than half of replying companies. And two out of three leagues receive major support from power companies

Let's get together

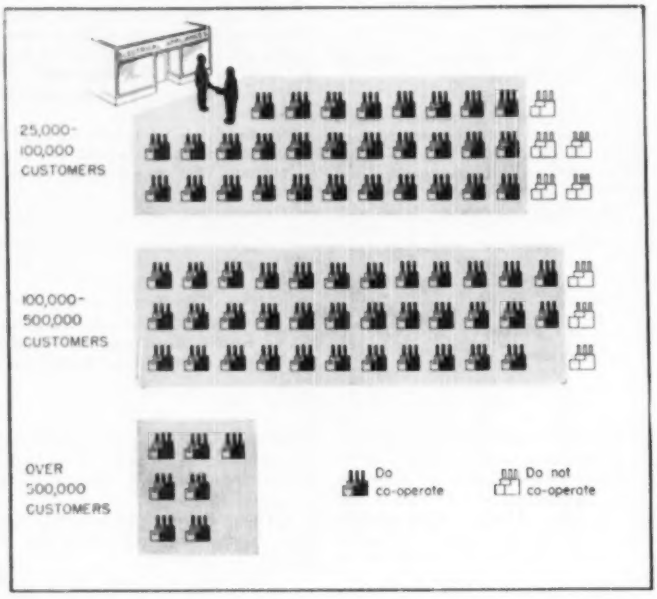
Does your company make any special effort to cooperate with dealers—joint advertising, organization and direction of sales campaigns, training of salesmen, etc? Cooperation with plumbers on water heaters?

ONLY 9 of the 81 replies failed to report some effort towards cooperation with electrical dealers. And not all of the 9 were unqualifiedly negative. Indications of future cooperation were given by 2, and one told of pre-war, but said nothing about present activities.

A simple "Yes" was the reply to the question on dealer cooperation in 39 cases, indicating that some or all of the instanced activities are used. The remaining 33 replies went into more or less detail on the extent of cooperation, showing that the subject was of considerable interest to the responders. Advertising, either joint or directing buyers to dealers' stores, was mentioned specifically in 19 replies; sales training 18 times; cooperation in sales campaigns 15 times; demonstrations of appliances sold by dealers 8 times; dealer contact men 5 times; cooperation through electrical league 4 times. One reply reported only limited cooperation since the war, that mainly in training dealer salesmen. Another reported cooperation, but not in well-organized fashion.

It is evident from the replies that the majority of power companies are cooperating in greater or less degree with plumbers in the sale of water heaters; 47 indicated such cooperation, 22 said "No," and 12 replies were indefinite. Of the 47 affirmative replies, 34 gave no details. The remaining ranged from enthusiastic to depressing report of plumber response:

"They sell a high percentage of water heaters, dishwashers and automatic laundries."



COOPERATION with dealers in several ways is general among power companies of all sizes

"Our 1950 program calls for special cooperation with plumbers on water heaters and other plumbed-in appliances."

"Plumbers in general have cooperated with enthusiasm in promoting the sale of electric water heaters."

"Plumbers are hard to educate but we are making progress."

"Plumbers are not very good water heater salesmen in our territory."

"We have cooperation with plumbers but I question its value. Last year we paid plumbers $5,700 in commissions. Over half of this was paid to 4 out of 44 who received any commissions. My reaction would be to forget the cooperation and hire additional salesmen."

"Fence-sitters" will dodge this one!

If your company is a combination gas and electric utility, would you say that electric system load building has or has not been restricted and circumscribed by desire to protect gas investment?

If yours is a straight electric utility, is it or is it not your observation that such restrictions and circumscriptions do exist in combination utilities?

REPLIES here fall into three groups. One is those in which response is made to the first question and thus are indicated to be combination utilities. There are 32 of these. The second group numbers 41, those that respond to the second question and so identify themselves as straight electric companies. The third group of 8 is comprised of those that do not respond or do so in such way as to prevent classification.

Of the 32 replies from combination utilities, 11 say definitely that electric load development has not been restricted by consideration for gas investment. There are 7 others that must be classed in the "No" group. Two of these say that promotion of one service or the other is based on consideration of customers' best interests. Another pair say that consideration for gas was a factor once but now has disappeared. The remaining 3 rather beg the question by saying, in one case, that, "We are sure electric only will tax our sales capacity for several moons," and in another, that, "I believe the combination operators are just as intelligent business men as any others and are perfectly able to deter-

mine intelligent sales policies."

That electric system load building has been thus restricted is the response of 14 replies from combination utilities. The count thus stands "No", 18, and "Yes", 14.

Of the 41 straight electric replies, 4 express no opinion. Each of the remaining 37 says that electric load building has been thus restricted. One of these persons expressed himself very emphatically on the matter:

"If combination properties were eliminated the benefit to the electrical industry would be tremendous. EEI is restricted in an effective range and water heater program due to membership of large combination utilities."

The final vote on this question thus is: electric load building restricted, 51; not restricted, 18; no opinion, 12.

Big bad wolf

Have you studied electric house heating as a service to be supplied by your company: To customers willing to pay for it as a luxury? To which all customers may look forward? At all?

Have you a rate at which you will accept house heating?

What do you tell a customer who requests service for house heating?

CONSENSUS of replies to this question seems to be that widespread use of electricity for house heating is a long way in the future. Although 56 replies say or indicate that house heating is receiving more or less study and consideration, the general impression taken from them is that, except for a few companies that now have the problem on their hands, no great concern is felt about it.

That house heating is a luxury service is the definitely stated opinion in 29 replies. That opinion is implied in 22 more. Only 15 replies indicate that house heating is a service to which all customers may look forward.

On the question of rates for house heating, 9 replies are non-committal and 18 say they do not have a rate at which the load will be accepted. Service at standard residential rate is stated in 9 replies; 37 do not specify or say "regular" or "standard" rate, thus permitting the inference that other than the residential rate is meant. Only 4 mention a special heating rate and 4 indicate that a special rate is under consideration at this time.

On what is told a customer who requests the service, 4 replies say no requests have been received and 3 report them as very few. Standing out from the others are 3 replies that report encouragement of the load by working with the customer on calculation of heat losses and on installation design. For what generally is told the customer, look at the typical quotes from replies in the accompanying panel.

What Do You Tell a Customer Who Requests Service for House Heating?

"Just what it will cost him. Then few want it. Hold out hope that in a few years heat pump will provide economy in conformity with service and convenience."

"Do our best to discourage. We now have 2,500 electrically heated homes and thousands more partially heated with electricity. At present rates this load is not profitable. Shortage of power in our region causes us to discourage the load at this time. When power becomes available we must be in position to respond to demands for this service with rates that will reflect our costs."

"You can have it if you can afford it."

"Keep away from it."

"Give estimate on cost—if we are pressed."

"Heat pump."

"Gas has got it."

"No soap."

"We explain high cost of operation. Is he willing to pay such cost? Advise that no reduced rate will be available for house heating at our present operating costs."

"We tell the customer and the dealer we have no expectation of a rate lower than 2¢ per kwhr and there might be an added demand charge at some future time if that appeared necessary to make the business profitable."

The complacency quotient

Do you believe that unaided growth of load, plus economies in operation, plus possible rate increases will provide sufficient return on cost of added capacity?

Or do you believe there is a special and increasing urgency for aggressive load building because of this increased investment?

How do you think other executives of your company feel about this?

THAT LOAD BUILDING is necessary and urgent is agreed to by 76 of the 80 sales heads replying to this question. Only 12 of the 76 indicate that their feeling is not entirely shared by other executives of their companies. In 4 of these cases capacity shortages are given as the reason. Replies of the other 8:

"Most other executives agree that unaided growth of load is insufficient, but do not share belief that an aggressive program is urgent."

"Not too much thought."

"They feel as I do, but probably not so strongly."

"There is probably some diversity of opinion among them."

"They are gradually coming to the conviction long held by the sales department."

"There are two schools of thought. The issue becomes quite complex and confused."

"The majority of them feel as I do, but some opposition has delayed our sales program."

"While load is increasing at a tremendous rate and operating costs have not yet become entirely stabilized, they feel sales promotion should be held to a conservative amount."

The minority report is presented by only 3 replies and they are not entirely

in disagreement. One of the 3 agrees that unaided growth of load is not enough, but sees no special urgency in the situation. The second straddles by saying that unaided growth will provide return "to some extent" and he sees "need for load building also." The third, evidently a quite imperturbable soul, replies, "Could be" to the first question, "not losing sleep" to the second, and says his fellow executives share his mood.

Fencing you in?

Do you, or does the higher brass of your company, feel that all-out load building effort is not worthwhile because earnings are limited by regulation?

THAT TOP MANAGEMENT is not fencing them in as respects load building is stated by 69 sales heads, a number saying so very emphatically. Of the remaining 12, one does not reply to the question; 4 say that capacity is the limiting consideration; 4 sort of dodge the question; and only 3 admit being so hampered.

Count the cost

How are sales and promotion expenses budgeted in your company—as a percentage of actual gross revenue or as a proportion of estimated revenue from the particular load added? In either case what is the approximate percentage?

THERE ARE 73 responses to this question in the 81 returns. Of the 73, 21 give no figures. The 21 fall into 3 groups. The first contains 9 replies that say in effect that sales department budgets are based on experience without any determining tie to gross revenue or to EAR. Some typical replies:

"Not budgetted on any standard percentage. Considered as a cost item and justified on a cost per dollar of revenue."

"Budgetted to meet our planned activity."

"Budgetted to fit our current problems year by year."

The next group of 6 replies is evenly divided into those saying sales budgets are based on gross and on EAR, but

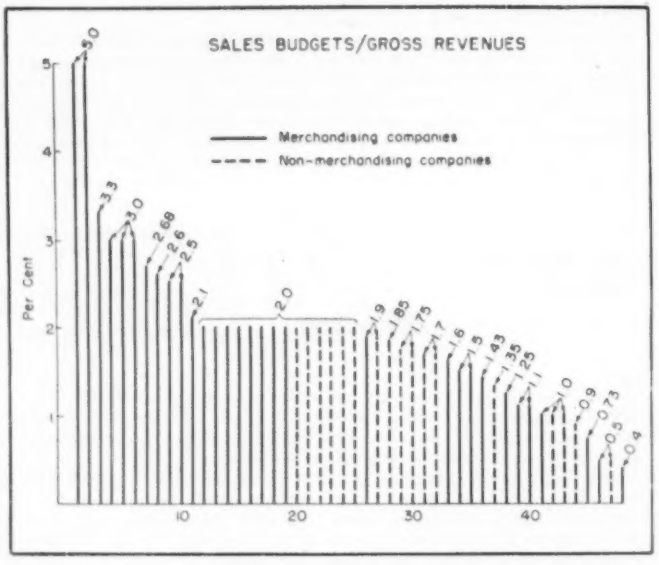
On the Problem of Sales Department Budgets

"Am working on that one right now. Am of the opinion that promotion expense should be on the basis of x% of gross revenues. The exact % will depend on the company—character of territory, etc. We are scattered and have high transportation costs. In 1949 promotion expense was 2.5% of gross. Don't think it should exceed 3%."

"At present we aim at about 2% of gross as net sales cost including merchandising. Since merchandising margins contribute materially to reducing net expense, 2% would be low for a company that does not merchandise."

"Total sales budget based on 5% of gross revenue; individual sales budgets on proportion of estimated revenue from particular load added, based on what we believe would be the most effective way to get quick revenue within 12 months from time of expenditure."

"We set up our program on what we consider a profitable activity in each field—commercial lighting and cooking, home lighting, appliance sales, industrial heating, etc. Naturally when our budget is completed we are interested in what percentage of gross it represents. We are not surprised if it is near the normal of, say, 3%. We probably would be shocked if it were as much as 5% or as little as 0.5. We thought it was fairly near normal at 1.5% in 1948 because of the high volume of walk-in appliance sales that year. We fully expected it would move nearer to 3% in a buyer's market—and it has."



LARGE RANGE in percentage of gross revenue budgeted for sales is probably caused by some merchandising companies not crediting appliance sales profits against sales expense

without saying how much. In the final group of 6, one says the idea of budgetted sales cost is now being considered; 2 are unresponsive; one cryptically says "neither"; 2 are quoted:

"Budgetted sales expenses have no relationship with anything except how much *less* than we spent last year."

"We don't have a budget based on anything."

The 52 replies that give data on sales department budgets show wide variation. The accompanying graph presents the picture of 48 that furnish percentages of budgets to gross revenues. The graph shows a narrower range and a generally lower-level of percentages for non-merchandising companies than for merchandising. This is probably caused by some of the latter companies not deducting appliance sales profits from sales costs. Of the remaining 4 replies, one gives sales expense in percentages of customer class revenue, 4.2% for residential, 1% for commercial, and less than 0.5% for industrial. The remaining 3, plus one from the group of 48, give budgets in terms of EAR—70¢ per dollar, 50¢, 30¢, and 12¢, again a wide range.

Don't drag your feet

Do you think a good job is being done in national organization of specific sales activities such as the Planned Lighting, Kitchenizing, Adequate Wiring and other programs?

Do you believe this job can be done better by associations such as EEI and NEMA than by individual manufacturers?

Are you using the sales helps provided in these programs or are you just buying some because you feel you ought to go along?

Or don't you buy any, feeling you can do better locally?

ONLY 3 of the 81 replies give a definite "No" to the first question above. Of the remaining 78, 62 say "Yes," 3 say "Excellent", 10 say or imply they think a fair job is being done, and 3 are unresponsive.

"Yes" is the reply of 59 to the second question. A few of the 59 qualified their affirmatives by such comments as "if they applied themselves properly." "No" is the direct response of only 5; 7 say the job should be done by both associations and individual manufacturers; only one votes for the individual manufacturer; and one is on the fence with "Not necessarily." "No opinion" say 2 replies; 5 make no answer. One reply is unclassifiable. It says, "Not if these associations are controlled by selfish interests."

Sales aids available in national programs are reported used by 63 replies. Of the 63, 40 replies indicate that large use is made of these aids. "Use what we can," "Where applicable" and "In a limited way" are responses typical of 19 replies. Only 4 replies say that some sales aids are bought just "to get along" and indication of that is contained in 4. No answer or a response impossible to classify is given by 10 replies.

Only 9 replies indicate local procurement of sales pieces and 7 of these say it is used to supplement material available in the national program.

They Like and Use the Sales Helps

"We use a lot of them and aim to use all we consider effective."

"We use them extensively."

"We are using them to very good advantage."

"Find them very effective."

"Not using them as much as we should."

"Recently have begun to use all helps to an increasing extent."

"We use 'em and I don't mean maybe."

"Using them. H——, we can't afford to just buy anything."

"No doubt we could use the available material to better advantage."

A Good Job in National Organization of Sales Activities

BUT—

"Not utilized due to lethargy and lack of planning of promotion time."

"Could be more aggressive."

"Planned Lighting best, rest just fair."

"Good as far as they go. Need more specific material such as for Spring Showing: Range Campaign."

"I feel we need some national campaigns such that manufacturers, dealers and utilities can coordinate on—using some good snappy slogans. 'Of Course It's Electric' was thought up by an engineer, not a salesman."

"Better than ever has been done in the industry, but as an industry program gas has got us beat."

"Could be better. Large lack of down-to-earth quality."

"Frequently the programs are styled for larger operations and do not lend themselves to use by smaller companies."

Bright ideas wanted

Have you any suggestions for additional sales activities that could be organized nationally?

Or for improvement or expansion of existing ones?

OF THE 81 REPLIES, 37 have suggestions in regard to national sales activities. Two others also have suggestions, but for a bigger job of salesmanship than was intended to be covered by this survey. They want a national campaign to sell private ownership.

Additional sales activities are suggested by 14 replies. Home lighting is the object of 3 suggestions:

"National activity designed to produce longer burning hours of home lighting."

"Packaging and promoting, through all outlets, of a home assortment of

bulbs of sizes used in the home the greatest number of hours per year."

"Open up all possible avenues to the home lighting market—color and its application, standardized certified program. Better Light–Better Sight material, more films."

Commercial electric cooking gets 3 votes for a national activity.

The automatic home laundry is the object of 4 suggestions.

Water heating is suggested by 2 replies. One suggests plumber appeal, the other, "How about the gas, oil, coal, and electric people all getting together on it and then have a good old American fight for their shares?"

A joint campaign of frozen food producers, makers of home freezers, and utilities is suggested by one reply.

The home freezer, standardization of wiring codes, room air conditioning, and planned farm electrification are suggested by 4 replies.

Of suggestions for improvement of present national sales activities, 4 are for seasonal campaigns on appropriate appliances, 3 are for additional sales training, 2 for more cooperation by manufacturers, 2 for more attention to LP gas competition, 2 for improvement of the CLM activity (a better name for it, better coordination between interests concerned, more stability), 2 for more films for meetings and television.

Suggestions, Comments and Criticisms

"There should be more vigorous leadership, less drag in getting out new stuff.

"Cooperation of manufacturers with Kitchenizer program has been good—much more than lip service—but still not strong enough.

"Manufacturers' cooperation in lighting program nearly ideal in commercial and industrial, fair on certified lamps, on other residential lighting—flat on its face!"

"Let's have a national domestic and commercial cooking campaign in the spring, one on freezers in the early summer, one on air conditioning in the summer, and a lighting campaign in the fall. Let's throw in a running water campaign for rural areas, too.

"If we could get some good, not too expensive, residential fixtures and certified or similar lamps and promote these, too, it would help. We are not together on 'Certifieds' now.

"We need some 15-min and some 20-30-sec movie films, too, for promotional meetings and television. The films should sell service, not products. They are prohibitive in cost for one utility to buy, but we all could get by pretty cheaply if we all could use the same ones."

"Get some aggressive salesmen on the committees—

"Clean out the representatives of combination gas and electric companies.

"Eliminate some old members from committees each year.

"Select chairmen with more care as to promotion mindedness and less to seniority.

"Committees should be made more autonomous by removing veto power often used by EEI."

"Accurate table of average monthly consumptions of various major appliances under varying conditions that are reliable and not the propaganda of a hard-selling appliance manufacturer. Distribution of such accepted data to all appliance dealers who then could apply local rates would be a major sales aid. All dealers would then have comparable stories in operating costs."

"Planned lighting would be greatly benefitted by better distribution policies of manufacturers and by clearing up of price chaos.

"National range and water heater promotions would be more effective if combination companies would lift the gas umbrella.

"Greater standardization of water heaters in order to reduce prices.

"Pointedly combat false claims (by inference and otherwise) by gas industry relative to economics of commercial cooking, and domestic, to lesser extent."

Popularity contest

Here are lists of appliances and services in different customer classifications. Please rate them in each classification in the order (1, 2, 3, etc) in which emphasis is put on them in your load building program. Please mark (X) those that you do not promote at all. [In the questionnaire, here followed a listing of appliances and services as appears in the tables.]

EVIDENCE of the replies is that ranges are getting the most promotion in residential load building. They are put first in degree of promotional emphasis by 44 companies and in second place by 22, as shown in the accompanying table. Water heaters are put first by 21 companies and second by 27. Next in emphasis comes lighting with 13 companies putting it first, 7 second, and 17 third. Following in the table other appliances and services in the order of the numbers of companies giving them first place in promotion.

Many of the replies do not report specifically on residential appliances and services not promoted, but perhaps enough do so to indicate the general condition. On the no-promotion list television is first with 34 mentions, then air conditioning with 24, automatic washers 12, laundry dryers 12, dishwashers 9, small appliances 8, refrigerators 8, bed coverings 4, water heaters 3, and home lighting 2.

Degrees of Promotional Emphasis In Residential Load Building By Numbers of Companies

Appliance	First	Second	Third	Fourth	Fifth
Ranges	44	22	4	1	2
Water Heaters	21	27	5	4	1
Lighting	13	7	17	9	7
Refrigerators	6	7	16	10	4
Bed coverings	4	6	5	13	7
Automatic Washers	3	5	8	6	10
Clothes Dryers	2	3	5	8	11
Home Freezers*	2	3	1	3	0
Dishwashers	1	3	3	6	9
Air conditioning	1	2	5	3	1
Small Appliances	1	2	3	8	4
Television	0	1	4	7	4

* By oversight this appliance was not listed in the question, but added by several repliers.

In commercial load building 69 replies put lighting first in promotion and 10 put cooking first. Cooking is second in 43 replies, air conditioning is second in 16, and lighting second in 6. Third place in promotion is given to air conditioning in 34 replies, cooking in 12.

First emphasis in farm load building is given to domestic appliances by 34 replies, to farmstead production equipment by 19, and to water systems by 16. In the industrial field, first concern is with help in production problems according to 31 replies, with motor applications to 25, and with heating applications according to 13.

Degrees of Promotional Emphasis By Numbers of Companies

Appliances and Services	First	Second	Third
IN FARM LOAD BUILDING			
Domestic Appliances	34	15	11
Water Systems	16	27	11
Production Equipment	19	10	25
IN COMMERCIAL LOAD BUILDING			
Lighting	69	6	0
Cooking	10	43	12
Air Conditioning	1	16	34
IN INDUSTRIAL LOAD BUILDING			
Heating Applications	13	23	22
Motor Applications	25	19	20
Help in Production Problems	31	21	14

Those darn engineers

Do you run into any objections from the distribution department in regard to load building activities—generally or in respect to specific areas? Please give particulars.

REPORTING NO TROUBLE with the distribution department in respect to load building are 59 replies. One gives no answer to the question. The remaining 21 say they do run into objections. These replies range from "Some," "Nothing important," "Minor irritation" etc, to specific mentions of what the engineers object to—clothes dryers, welders, small 3¢ loads, commercial cooking, air conditioning, fluorescent lighting—load with high demands and low load factor—exceptional loads in areas where facilities are not adequate to maintain voltage or assure service continuity.

Objections? Yes

"Customers who force house heating on us make the distribution department very unhappy."

"The pressure of new construction during the past 3 years has put the sales department in the First Class S.B. class in the minds of the operating men. However, they are human and the condition is not serious."

"Of course. However, we manage to get along. The general idea has been established that the objective of our company is to sell service and that it does not exist simply so that: (1) The controller will have something to control, (2) the accountant will have something to account for, (3) the engineer will have something to engineer. In this we are indeed fortunate."

"It is just beginning to show. In the past 10 days our engineering department brought to attention at a staff meeting that there were some areas where saturation of ranges was such that it would be advisable to study whether or not promotion of this appliance in this area should continue."

"Generally not as alert to the customer's viewpoint."

Objections? No

"No. We have little or no static or heckling from the engineering people."

"None particularly. Always have been overruled by management."

"Work well together. But each has its problems."

"Honestly, no differences worth mentioning. We have consistently endeavored to keep the operating and accounting departments sold on the idea that the new business activities are vital in producing growth and more jobs for them. They at least act like they believed us."

"Was true in the past, but from now on we secure the load and the distribution department must take care of capacity."

"Not objections. But some predictions against equipment with exacting requirements in respect to interruptions of service in areas where frequent interruptions are unavoidable."

—and the rate guys, too

What is the policy of your company in regard to 3-phase service to residences and farms?

Does the rate department require customer contribution for such service? If so, how much?

Is that an obstacle to load building?

ONLY 3 REPLIES say definitely that 3-ph service is not available to residences and farms. And only 5 say that such service is discouraged, although that attitude is clearly apparent in a great many of the other replies.

On the question of customer contribution for 3-ph service, 13 replies are not responsive, 4 indicate no stated policy, and 20 say no contribution is required. It is required in the report of 39 replies. In only one of these replies is it said or implied that the customer pays a lump sum, and then it is his choice between that and a fixed minimum bill. In 27 replies this point is not clear, and in 9 it is definitely stated that the customer contribution is collected either in billing over a period of time until the amount is paid or funding the amount as addition to the rate. In 28 replies no figures are given. Typical of them:

"The customer pays the difference between single-phase and 3-ph service."

"The amount in excess of what the annual guarantee will support."

"Excess over amount yielding a fair return."

"Only where excessive investment is required."

"Only if the EAR is too much out of line."

The replies containing specific data are presented in an accompanying panel.

That requirement of customer contributions for 3-phase service is not an obstacle to load building is the opinion stated in 34 replies. That it is an obstacle is the definite opinion in 3. That it is "not yet," "could be," "not seriously," "not much," "not particularly" an obstacle is stated in 17 replies. Unresponsive on this point are 27 replies.

Customer Contributions for 3-Phase Service in Single-Phase Service Areas

"All costs over 3 times EAR from the initial service."

"Increase monthly minimum for 4 years, or cash equal to cost."

"EAR must, in general, approximate ½ of investment for new or enlarged facilities."

"Company requires contribution if revenue to cost ratio is low or if there is question as to credit or permanence. If return is low, customer guarantees monthly minimum of 2% of the local facility cost. If credit or permanance is in question, a deposit is required equal to connection and disconnection cost. This is refunded over 5-year period at rate of 25% of revenue, but not exceeding 20% of the total per year."

"A minimum of not less than $3.75 per month or 75¢ per month per connected hp."

"Guarantee of 1.25% per month of actual construction cost."

"We invest—roughly—on a base of cost equal to 6 times revenue. Beyond this point, minimum charge is increased to maintain this ratio."

"Our present policy provides for a $10 per month minimum for 3-ph."

Who's he working for?

Is it the practice in your company to charge the time and expense of non-selling activities performed by sales personnel to the appropriate non-sales accounts?

TO THIS QUESTION the replies give 31 definite "No's," including one "No, dammit." The definite "Yes'es" number 32, including one that says, "If I watch closely to be sure this is done," and another, "We ask all sales personnel to watch this as it may help us keep within our sales promotion budget." Between these groups are 9 replies of the "No, except . . ." and "Yes, if . . ." class. They say that major non-sales work is charged to the proper non-sales account, incidental work is not. Typical of these:

"No, except when commercial or industrial men do actual engineering work on facilities to serve customers, farm men get right-of-way, or such clear-cut instances of work that should be charged to operating or capital accounts."

Dampers on selling

Do you think the rate schedules of your company should be changed in order to facilitate load building and improvement of earnings?

Do you think changes in service rules would have the same result?

THAT RATES are satisfactory in respect to load building and to improvement of earnings is the opinion expressed in 47 replies. Of these 37 give a simple "No" to the question above. The remaining 10 imply "No" with such phrases as "Not necessarily," "Well in line," "Generally favorable," "Constant revision," etc.

Only 4 replies give an unqualified affirmative to the question. "In some cases," "In small part," "To a certain extent," are typical responses in 8 replies. Better water heater rate is wanted by 2 returns, higher rates by 3, and change in commercial rate by one. Rate revisions in process or under continuous review are stated in 7 returns.

Occupying the middle ground are 9 returns. Of these, 6 are unresponsive and the remaining three are:

"Not for load building. Probably for earnings."

"OK for load building. Earnings???"

"As commercial manager, yes. As rate engineer, no. As purchasing agent, don't give a damm. As director, ?"

That service rules are no hindrance to load building is the definite opinion of 36 replies. Agreement with this opinion is implied in 8 more with such comments as, "In no important respect," and "Liberalization of rules would possibly permit a slight increase in load added, but it would probably be at the expense of unsatisfactory performance of customers' equipment."

That they are a hindrance is said or implied by 20 replies, but only 5 of these are simple affirmatives and 15 qualify their answers.

Be *honest*, now

Would you have to admit, if the truth were forced from you, that the selling holiday of the war years and of those following when capacity was short, has dulled the edge of your own sales enthusiasm?

IN THIS IMPERTINENT, but important, question, the 81 survey returns can be classified on each side of the 5 that maintain neutrality by giving indeterminate or no answers. On the "No" side stand 45, 26 of them emphatic in their negatives and the other 19 explaining or perhaps hedging a bit. Here are some samples of the 19:

"Not enthusiasm. It takes time to regain momentum."

"I do not believe so. Our sales program has never been an emotional affair."

"It has not dulled my enthusiasm. However, I believe its effects have been an influencing factor on our sales efforts as they are controlled by management."

"The problem is to study conditions and not be rushed into substantial promotion expenditures before they are warranted."

"Of course we are older, but we can have a lot of fun between now and 65."

"It certainly has not, but it has raised H—— with those in the firing line (salesmen)."

"Not mine, but it sure has slowed down the second and third level of salesmen."

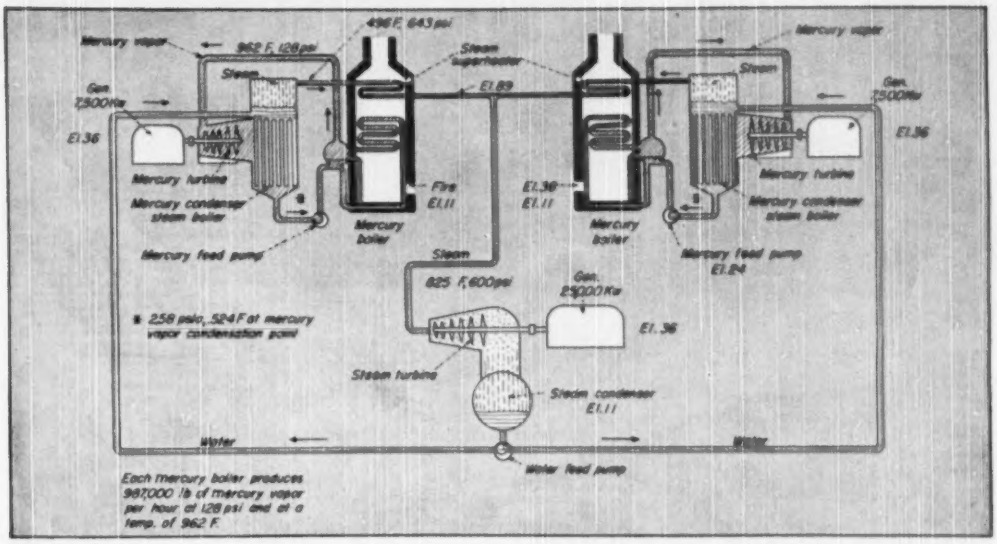
On the "Yes" side of the 5 neutrals there are 31 replies. Of these, 16 are unqualified affirmatives, stark and bare. Eight of the remaining 15 admit that their enthusiasm was dulled, but now is keen again. The feeling of these is expressed by one of them:

"It sure did. But the war ended 5 years ago and anyone can sharpen an axe in that time."

The other 7 express themselves variously:

"To some extent, perhaps. The greater influence would be, I think, that after many years (of difficulty) a certain 'fed up' feeling develops. In good times we (sales folks) are tolerated as being likable but not entirely essential. In bad times we are criticized for not doing the job faster for less money. . . . that is inherent in the job."

"Before the war we were able to steer our course, having in mind just where we were going. Today, considerable confusion exists and I sometimes question whether anyone knows where we are headed for."



MERCURY-STEAM CYCLE used at Schiller station. When station is operating at base load, mercury turbines run with control and stop valves wide open, their output depending on rate of vapor generation in fuel-fired mercury boilers. Steam produced by rejected heat of mercury turbine exhaust is used in steam turbine-generator to produce about 60% of total station output. Capacity of the plant is 40,000 kw

Binary Cycle At Schiller Station Offsets High Fuel Cost

First coordinated mercury-steam power plant takes advantage of 36-37% thermal efficiency of binary cycle to offset high fuel cost. Economy guaranteed is 9,200-9,400 Btu per net kwhr for oil and coal. Cost is $325 per kw of initial capacity

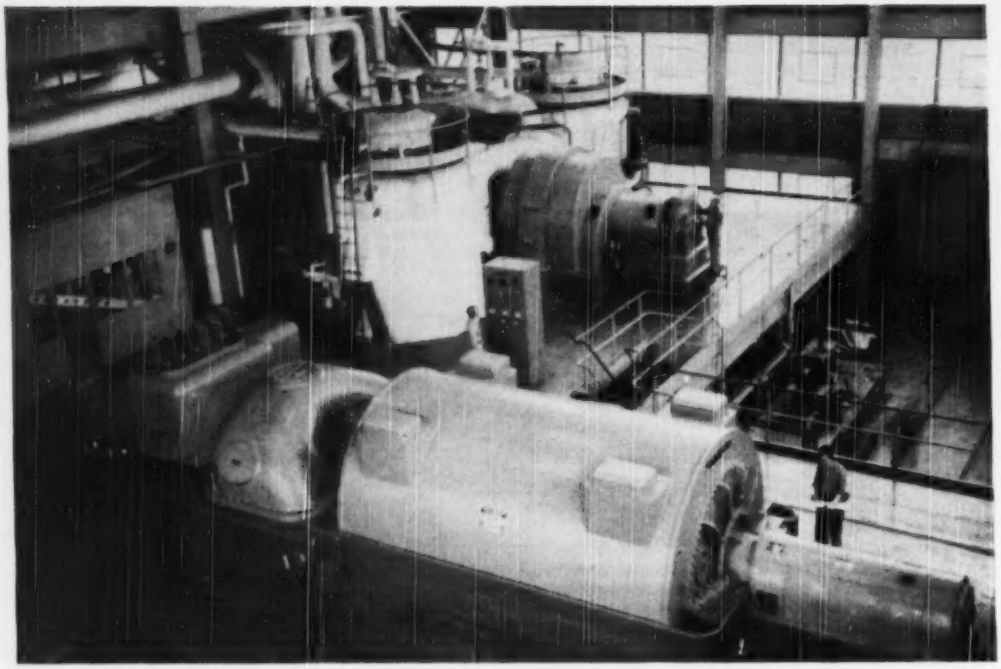
H. D. RESSEGUIE
Engineering Dept
Public Service Co of New Hampshire
Manchester

A QUARTER CENTURY of successful binary-cycle experience in power plants where the mercury cycle was superimposed on an existing steam cycle has led Public Service Co of New Hampshire to take a further step.

On November 21, 1949, this company placed in service the first utility generating station, in this country, to be conceived and built from the outset as a coordinated binary cycle station. All previous binary cycle installations of the mercury equipment were added to a station originally designed for steam-electric generation.

For the conditions prevailing on the Public Service Co system a fuel-burning binary cycle station, located at Portsmouth, appeared to be the answer to the latest investigation of economic locations and types of equipment. Because of its greater thermal efficiency a mercury-steam station offered economic compensation for the extremely high fuel cost in the Portsmouth area. President A. R. Schiller of Public Service—for whom the station is named—puts it this way:

"These high (fuel) costs are the natural result of the great distances between New England and supply sources. These alone bring the question of fuel economy into bold relief. They provide the basis for striking a balance between the greater efficiency of the more expensive binary cycle and the less efficient, and also less costly, fuel plant of the conventional type. By its very nature, a binary cycle plant is more expensive to construct, but it will produce a given amount of electrical energy from about 75% of the amount of fuel needed in a conventional steam plant. In studying the situation we felt that we could recover the premium in construction costs over the 40 or more years' life of the plant through the



MAIN OPERATING FLOOR—the 25,000-kw steam turbine is in foreground, boiler and turbine control room at left. One of two 7,500-kw mercury turbine units with its condenser boilers is in rear. Second mercury turbine unit, not visible, is at the extreme left

savings in expenditures for fuel."

Schiller station has 40,000 kw of nominal capacity, composed of two 7,500-kw mercury units and a 25,000-kw steam turbine unit. There are two mercury boilers and two mercury turbogenerators with condenser boilers. The steam turbine generating set operates on steam generated in the condenser boilers. There is no steam boiler, in the usual sense.

In speaking of construction cost President Schiller, in a statement issued about the time the station was opened said that at . . . "the 40,000-kw (initial) rating, the plant and its associated substation and transmission line connections will cost about $13 million. The $325 per kw is a high figure for a plant with this nominal rating, but it should not be overlooked that much of the money spent for land, dockage, fuel handling, fuel storage, condensing water and other included items while necessary for the initial station will be adequate for a station of at least 160,000 kw. Even at present construction cost levels, the future possibilities of this site can and undoubtedly will be developed at a unit cost much less than the initial figure."

The mercury-steam design for Schiller offered an overall thermal efficiency of 36 to 37%. This compares with around 30% from a modern 850-psi, 900-non-reheat 40,000-kw steam plant. It is based on using 128 psi, 944 F mercury vapor and 600-psi, 825 F steam.

A coordinated mercury-steam design makes possible higher overall plant efficiency than can be obtained with conventional steam units. Any of the steam pressures now in use can be topped by the mercury cycle with this objective. In general, mercury topping units for existing steam plants will usually produce more than twice as many 4,000 Btu kwhr per 1,000 lb of steam topped than the best steam cycles.

In Schiller station's design advantage has been taken of experience gained at the Pittsfield, Hartford, Schenectady and Kearny binary-cycle installations. The record of the Kearny mercury boiler has been very creditable so far as any factors concerning mercury are involved since it was rebuilt in 1938. Prior to the installation of mechanical precipitators ahead of the fans at Kearny a high percentage of outage resulted from fan wear due to large particles of fly ash. At Portsmouth both electrical and mechanical precipitators will be used when coal is fired. At present oil is used.

The mercury section of the plant has several advantages:

1. In mercury turbines experience shows that wear due to erosion and corrosion is extremely small.

2. Since the condenser boiler is a heat exchanger operating on a 30-deg temperature differential the problem of feed water treatment has been greatly simplified.

3. While the temperature at which mercury is vaporized is high, pressure below 150 psi is utilized. This reduces stress problems in the design of the mercury boilers, turbines and piping and, hence, cost.

4. Optimum plant heat rate is secured with the steam section at moderate pressure (600 to 850 psi) in design range.

Mercury turbine inspection may be

scheduled at intervals of several years, according to experience with units now in operation. Boiler and furnace inspections are recommended on the same schedule as steam generating units. The 10,000-kw Hartford mercury turbine unit operated 116,000 hrs between inspections and was then opened only for final dismantling prior to installation of a later and larger unit. The 20,000-kw mercury turbine unit at Kearny station has not been opened for inspection since 1939, but is due for overhaul this year. Similarly the 20,000-kw mercury turbine in service until last year at Schenectady had not been inspected since 1935.

The Schiller station's mercury unit is practically identical in design with the recently-installed equipment at General Electric Co's Pittsfield Works. For example, three boilers were manufactured from the same mercury design drawings; two for Schiller and one for Pittsfield. These mercury turbines are exactly alike, as are their six condenser boilers. The steam turbine and generator are of conventional design and the former exhausts into a 2-pass condenser of 21,590 sq ft surface. The mercury boilers are each rated at 987,000 lb per hr flow at a maximum pressure of 155 psig, temperature 990 F. Each condenser boiler is rated at 80,000 lb per hr of steam at 670 psig maximum. Each 7,500-kw mercury unit plant requires about 160,000 lb of liquid mercury.

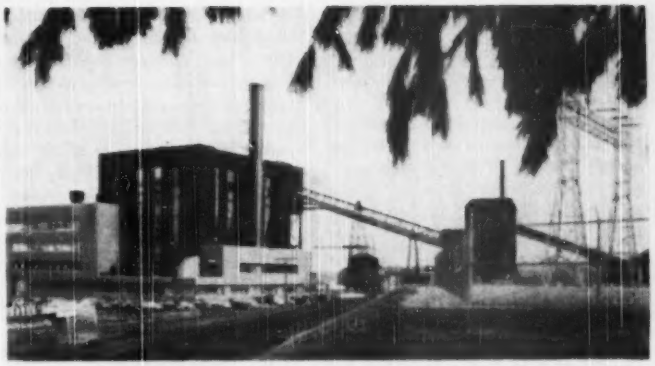
Plant Location

Schiller station is located on the New Hampshire side of the Piscataqua River about one mile above Portsmouth and some two miles from the ocean front. This stream has a tidal velocity of about 6 knots and supplies ample condensing water at all times. Adjacent to the station is the company's floating power plant "Resistance," containing one 30,000-kw steam turbogenerating unit. Both of these plants are tied into the 115-kv transmission system of the Public Service company, which is also interconnected with the New Hampshire Gas & Electric Co at Portsmouth and at Nashua with the New England Electric System.

At Schiller, a mutually profitable arrangement has been made with a large New England fuel company for the joint use of dockage and unloading facilities for both coal and oil. With this arrangement the Public Service company has not only lowered its own fuel costs but also those of many New Hampshire people through the establishment of a (35-ft low water draft) deep water terminal here. Tankers of the T2 rating (about 105,000 bbls) can be easily berthed at this terminal. Two main storage oil tanks totaling 110,000 bbls capacity belong to the utility and a coal yard 500 ft long x 250 ft wide is available on the property.

A 75,000-gal reservoir supplied from two wells owned by the utility provides ample fresh water for make-up and other uses. Flexible fuel handling facilities exist between the commercial company's property and the utility equipment. A 3,000-gal fuel oil station storage tank is located in a concrete vault at one end of the plant. A 1,200-ton coal bunker is located above the mercury boilers, and conventional weighing, distributing and pulverizing equipment is provided. Each of the two types of fuel-burning equipment is of standard design with the exception that a set of low-load fuel oil burners has been installed for each mercury boiler to satisfy expected station minimum loads.

Present station volume per kilowatt



SCHILLER STATION'S main building contains 47 cu ft per kw of capacity, its plant area is 0.68 sq ft per kw. Enclosed are two mercury boilers, two mercury turbine units and a steam unit. Visible are coal conveyor, crusher house and terminal structure of step-up substation

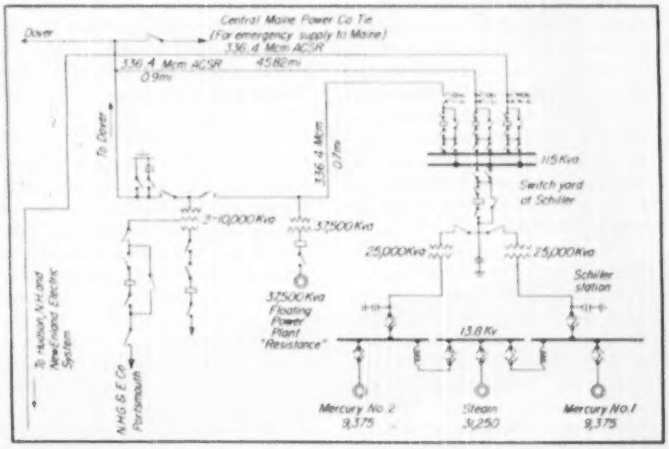


DIAGRAM OF SYSTEM CONNECTIONS associated with Schiller Station. Floating power plant "Resistance" (30,000 kw) is adjacent to station. Its connections to outgoing lines and a tie line with New Hampshire G & E and Central Maine Power systems are also shown

of capacity is 47 cu ft. Centrally located are the two 7,500-kw mercury units and related condenser boilers, with the 25,000-kw steam unit. Adjacent to the turbine room but close enough to minimize pipe runs are the two mercury boilers and their fuel supply systems. Within this area are also various water treating, water storage and feed water heating equipment, auxiliary power supply equipment and other accessories to produce a well-balanced and adequate plant. There are two induced draft fans with a centrally located steel stack 150 ft high and 9 ft in inside diameter. Plant area per kilowatt of initial capacity is 0.68 sq ft, ground dimensions being 200 x 316 ft. The electrical bay is large enough for future expansion. Ash precipitation equipment is located in an extension of the building. Collected fly ash is removed, when burning coal, by means of a pneumatic system.

Electrical Control Room

The electrical control room is above the main operating floor. This location facilitates both routine and emergency communication with the station staff. Detailed control of mechanical equipment is from a centrally located supervisory room on the operating floor. The three main turbine sets are started by manual control on each unit. Once in operation, however, control and loading may be either manual or fully automatic from this control room.

The two mercury units may be operated together or as separate units automatically or manually controlled by a master controller over the complete operating range of loading. As individually controlled units, each 7,500-kw mercury plant may be operated independently. Thus, one unit might be at full output and the other at variable load to meet station fluctuating demands.

Each mercury turbine is a 1,200-rpm machine. The 25,000-kw steam unit runs at 3,600. Unlike a conventional steam plant, when operated at base load, the two mercury turbines run with their control and stop valves wide open, thereby receiving their mercury vapor directly from the boiler drums. Their electrical output is a direct function of the rate of vapor generation from the fuel supplied by the mercury boiler burners. The larger the electrical load demand, the greater the direct fuel requirements. Each mercury turbine has a standard rotating pilot type speed governor with motor-operated synchronizing device and an oil-operated, spring-closed stop valve. The stop valve is controlled by a 3-way emergency oil trip valve in the governor pedestal. The steam turbine has the conventional complement of speed and emergency controls and an initial pressure governor designed to operate over a steam pressure range of 500 to 620 psig at full output.

The effect of the operating procedure outlined above upon the steam turbine output is definite. The steam produced by the rejected heat of the mercury turbines' exhaust, in the condenser boilers, must be used by the steam turbine generator to produce about 60 percent of the total station output. Hence the steam turbine output and that of the entire plant is a direct function of the fuel burned in the mercury boilers. If desired, the plant may be operated to control the system frequency by suitable manipulation of the steam and mercury speed governors.

Each of the mercury boilers has two mercury vapor leak detectors. One is of the chemical type and the other of the electronic type. They are similar to those now operating at Hartford, Kearny and Pittsfield. Fog-type boilers have been used in all cases. The 7,500-kw mercury units resemble the new 15,000-kw installation at Hartford. The most notable difference between them and Kearny installation is in the style of mercury boilers, turbine and condenser boiler designs and arrangement.

Plant Flexibility

The flexibility of the plant at Portsmouth has been well shown in early operation. The plant load has varied from a minimum of 5,000 kw, with but one mercury boiler in service, to about 42,000 kw with both boilers, two mercury turbine sets and the steam turbine unit all on the line.

All auxiliary drives are electrical except for a steam-driven standby condenser boiler feed pump. Two motor-driven mercury boiler feed pumps per boiler were provided. Each is rated at 200 hp and has a capacity of 1,350,000 lb per hr. A 300-hp induced draft fan and 125-hp forced draft fan go with each boiler. Water for the four condenser boilers is supplied by three full capacity feed pumps, rated at 400 hp each. One is steam-turbine driven and the others electrically driven.

The net heat rate of the mercury-steam plant is about 220 Btu per net kwhr lower when burning oil than coal. Gross station output is not diminished, but there are higher requirements for auxiliaries with coal burning, such as pulverizers, ash sluicing pumps, high-pressure soot blowers and air compressors.

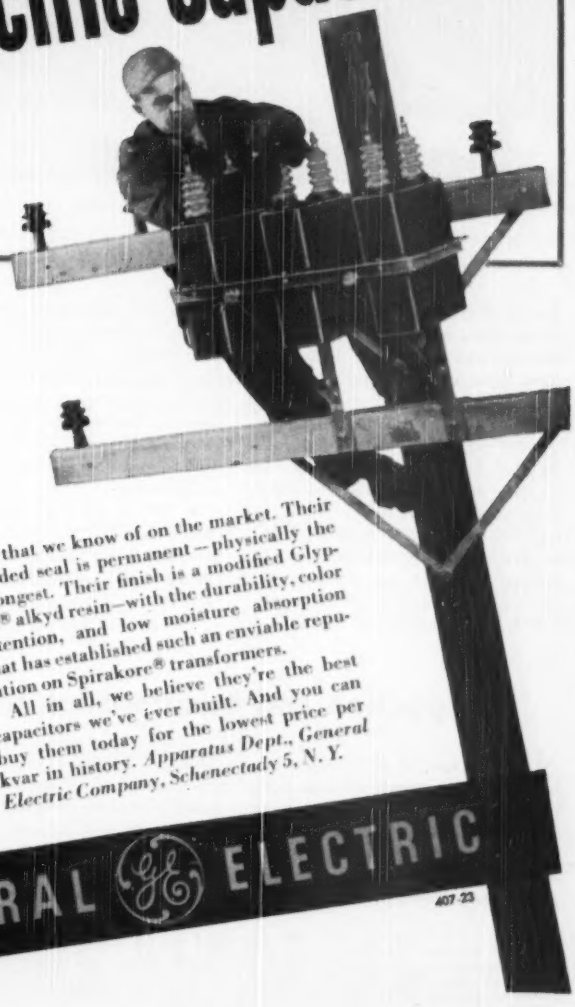
Energy is generated at 13.8 kv, 3-ph, 60 c. The output of the three units is paralleled on a 3-section bus. Truck-type air circuit breakers provide protection for generators, bus section ties and feeders to a switch yard outside the plant. Reactors are provided between the main bus sections. Two 25,000-kva 3-ph transformers step up the potential to 115 kv for transmission to other points on the Public Service system and interconnections with other utilities at Portsmouth and Nashua.

Station Auxiliaries

Station auxiliaries are supplied from the 13.8-kv main bus through two transformers serving two groups of 2.3 kv switchgear. Connected to each group is a load-center substation for 460-v service. Motors of 100 hp and over are served at 2.3 kv. Integral hp motors below 100 hp are supplied at 460 v. Fractional hp motors and the station lighting system are served by 115- or 230-v circuits through small air-cooled transformers connected to load center feeders. Energy for station controls and lighting in an emergency comes from a 60-cell storage battery. To transfer auxiliary supply sources and bring reserve auxiliaries into operation automatic equipment is extensively used. A comprehensive annunciator system, automatic telephone facilities and separate loud-speaker paging system aid control room operators in performing both normal and emergency service functions.

The total plant operating staff is about 34 men. Excluding maintenance forces, the operating staff per shift requires one watch engineer, two boiler control room operators, one switchboard room operator and two equipment attendants.

10,000,000 kilovars prove you can depend on General Electric Capacitors

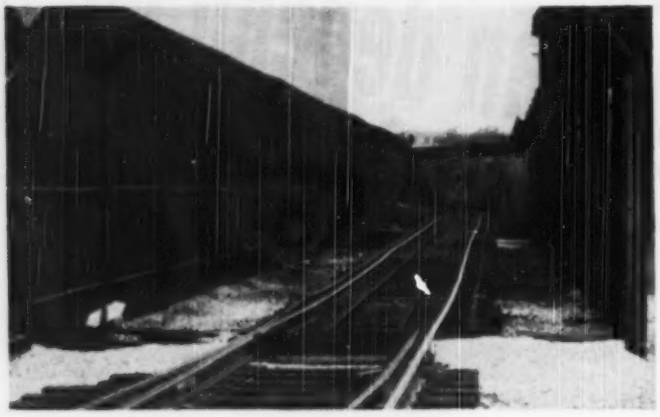


More than 10,000,000 kvar of General Electric capacitors are in service today! Some have been supplying kilovars for 20 years. Among them are the first capacitors to be filled with a non-flammable liquid dielectric; the first capacitors with deep-drawn steel containers; the first capacitors to have welded-on glass bushings, the first capacitors to be rated 15-kvar, and the first to be rated 25-kvar.

Today's G-E power capacitors are the smallest in size and lightest in weight of any that we know of on the market. Their welded seal is permanent—physically the strongest. Their finish is a modified Glyptal® alkyd resin—with the durability, color retention, and low moisture absorption that has established such an enviable reputation on Spirakore® transformers.

All in all, we believe they're the best capacitors we've ever built. And you can buy them today for the lowest price per kvar in history. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN



COAL TRACK through car-dumper house and around plant eliminates normal switching since empties can be pushed on around loop

GAS HEAT will thaw up to eight frozen cars in 20 to 60 min by means of four perforated gas pipes along tracks (left). As many as 75 cars have been unfrozen in a single day

Coal Handling Without Switching

In an effort to reduce labor and increase plant reliability, coal handling facilities of the Toledo Edison Co have been completely revolutionized.

In 1946, a car dumper installation was designed for an ultimate capacity of 800 tons/hr and included belts, Bradford breakers, and provisions for storing and reclaiming coal with earth moving equipment. Track layout forms a loop around the plant so that coal may be fed into the dumper in loaded cars and the empty cars pushed on around the loop without the usual switching. Also, parts of the old plant had bunkers of inadequate size and 2,000 tons of outdoor bunker storage was provided in silos. Thus, if it is necessary to charge plant bunkers more than once a day, these bunkers can be charged by the pushbutton operation of belts and feeders and no coal unloading crew is necessary.

In 1948 a new unit with 36 hr of coal storage made it possible to run the plant over Sunday without unloading coal, and brought total capacity to 800 tons an hour.

An eight-car thawing track consists of vertical sheet metal windbreaks on each side with four perforated gas pipes laid along the track. A string of eight cars not too badly frozen can be thawed in approximately 20 min. Badly frozen cars require 60 min. Since gas is purchased at this plant on an equivalent coal cost basis, the cost of the heat required for the track is very reasonable. This thawing track operates so successfully, that it has been possible to unload and store as many as 75 cars per day when winter time market prices make this type of operation profitable.

Inspection and Maintenance of Fire Extinguishers—II*

Maintenance of all extinguishers is the duty of a repair shop foreman, who is also responsible for discharging and recharging soda-acid and Foamite extinguishers at the January inspection. In addition, he recharges units when notified by the inspector.

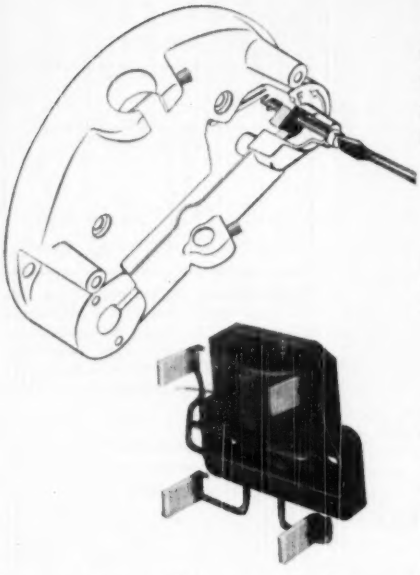
Soda-acid units are inspected by removing the cover and checking the quantity of soda solution and acid. If the acid is discolored or shows any signs of reduced effectiveness, it is replaced. The rubber hose is carefully examined and is replaced if defective. The nozzle is also examined and a wire inserted its full length to be sure it is not stopped up.

At every January inspection the wire is run through the hose, and the extinguisher discharged in the regular manner. The inspection then proceeds as follows: (1) Line up all empty extinguishers, remove caps, take out acid bottles and place them adjacent to their respective extinguisher. Care must be taken not to mix parts as all are not interchangeable. After lining up, fill each extinguisher shell to overflowing. Note

* Part I presented inspection and maintenance responsibilities; inspection of carbon tetrachloride extinguishers. Part II covers inspection of soda-acid and Foamite extinguishers.

Be thrifty—use the I-50

THERE'S LESS TO ADJUST!



A fraction of a dollar spent on watthour-meter adjustment—multiplied by the number of meters you own—can add up to a sizable unnecessary expense. With the I-50, exacting factory tests provide correct calibration, and unit construction assures that this calibration will be maintained. Here's how:

Permanent, stable characteristics reduce the need for service adjustments to extremely narrow limits. A refined micrometer adjustment provides all the range ever needed. Conventional meters, with more chances for error, require larger ranges and coarser adjustment.

Unlike conventional meters, no adjustments need be made for lagging power factor, thus none is provided for. The exclusive unit construction of the electromagnet—with all parts *permanently* fixed in place—makes a permanent factory adjustment of the lag plate possible.

time to retire ... old watthour meters?

It may cost you more to keep an old watthour meter in service than to replace it with a modern I-50. Here are the reasons:

1. **LOSS IN REVENUE AT INCREASED LOADS**
2. **EXCESSIVE OPERATING EXPENSE**
3. **HIGH COST OF REBUILDING AND MODERNIZING**

Adopt the I-50—today's most modern meter—as your *standard*. It *earns* more—by accurate overload registrations. It *saves* more—by its design for fewer adjustments, less maintenance. Ask your G-E representative for full information. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

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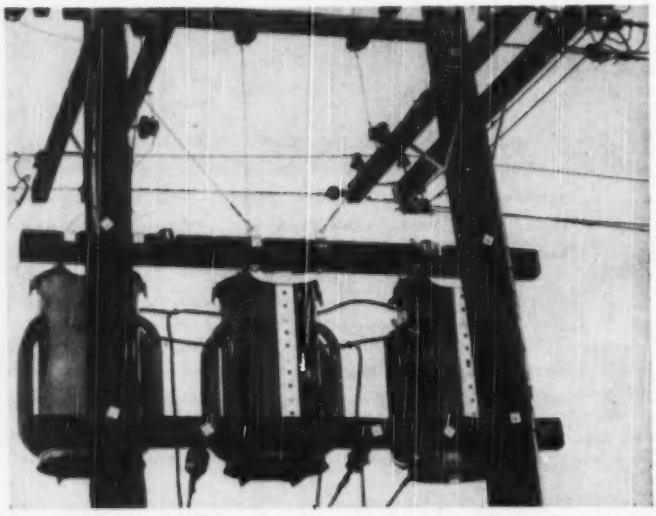
603-35

whether the water flows through the hose and nozzle of each. Correct condition if necessary; (2) Up-end each shell, wash off caps and return shells to upright position. Examine interior with electric lamp or flashlight. Note any unusual condition inside the shells. Those exhibiting excessive corrosion or other abuse, such as severe denting or damaged threads, should be set aside for further action at the discretion of the repair shop foremen. Outlet screens must be clean and free of corrosion; (3) Due attention must be given to cap and bottle assemblies. Cap threads should be clean and sharp, not worn. The cap should have a properly fitting rubber gasket which should be clean and flexible. Bottles should be checked for cracks and bottle holders for corrosion. Stopples must be in good condition and standard for each bottle; (4) Charges must be mixed and powder properly dissolved before filling. For this purpose obtain a clean galvanized pail. Use the quantity of water (preferably lukewarm) specified by the manufacturer and dissolve in it the specified amount of bicarbonate of soda (baking soda). Stir until thoroughly dissolved and then fill each shell to the filling mark on the inside of the shell; (5) As each extinguisher is assembled a dab of vaseline or cup grease should be spread lightly on the inside of the cap.

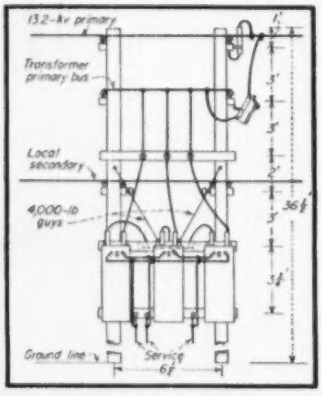
Foamite Extinguishers

These units are inspected by removing the cover and noting the quantity and condition of the two solutions. If there is any indication of mixing in these solutions the unit should be refilled. A wire should be run through the entire length of hose. At the January inspection this type of extinguisher should be discharged and recharged. In general the recharging procedure is the same as for soda-acid extinguishers.

• • •



TWO POLE and cross timber construction, used for mounting a bank of 50-kva, 7,620–120/240 transformers connected wye-delta, resulted in considerable saving in materials and labor over the conventional platform job. It is also a more sightly installation



DIMENSIONAL DRAWING of two pole and cross timber construction transformer rack designed for 75-kva maximum transformer size. Note that center transformer, although hanger mounted, is supported by two 4,000-lb copper coated guys at 45 deg

Two-Pole and Cross-Timber Type Transformer Rack

D. E. THERRELL
General Foreman
Electric Distribution Department
New Orleans Public Service, Inc

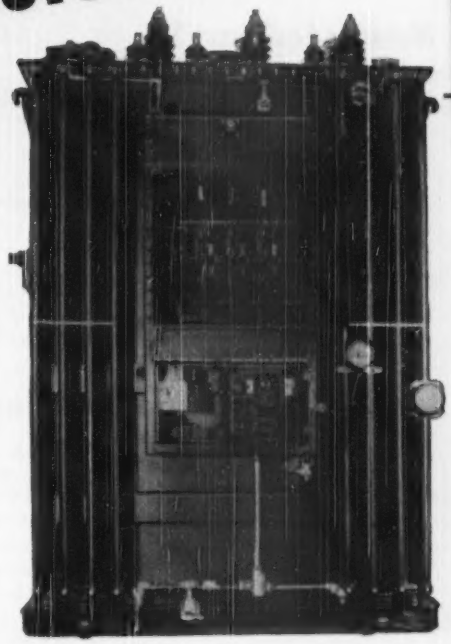
A TWO-POLE cross timber method of mounting transformer banks has been placed in service by New Orleans Public Service, Inc. In working out requirements for a safe, rugged job, it became obvious that the installation would be more sightly than platform construction. This, in itself, was a very desirable feature when considered from a public relations standpoint.

Transformer sizes were limited to 75 kva capacity, with a maximum of three transformers per installation. The poles were spaced 6½ ft center line to center line, with two 4 in. x 6 in. x 7½ ft horizontal fir timbers separated the distance required by the length of the transformers. The two outside transformers were either pole or hanger mounted, with pole mounting preferred. The center transformer was hanger mounted on the wood cross member, but its entire weight was supported by the two 4,000-lb copper coated guys, as shown in the illustration. The angle of these guy supports was approximately 45 deg. A ⅝ x 8 in. eye bolt passed through the top of each hanger iron down through the cross member and was attached to the pole with ⅝ in. eye bolts.

The cost saving of this job over the conventional platform installation was approximately $107 in materials and $50 in labor.

This method proved so successful and practical that its use has been continued.

Now-
Get load ratio control
—still save with
RM* Transformers



Automatic load-ratio-control equipment, for changing taps under load, is now optional on General Electric three-phase oil-immersed RM-listed Power Transformers:

20% range—10% plus to 10% minus
32 5/8-per-cent steps
Available in 1391 different ratings—
All kva's from 750 to 10,000, three-phase
All EEI-NEMA preferred voltage ratings between:
6900 and 67,000 high-voltage
2400 and 14,400 low-voltage

*RM means "Repetitive Manufacture"—a type designation covering G-E power transformers with standardized construction up to 10,000 kva and 69 kv. This effective standardization—sensibly flexible with optional features—spells lower costs for you. RM prices are eight per cent lower. RM shipments with load-ratio-control average 15 weeks.

For information on RM transformers with load-ratio-control feature, ask your nearest G-E Apparatus Sales Office. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

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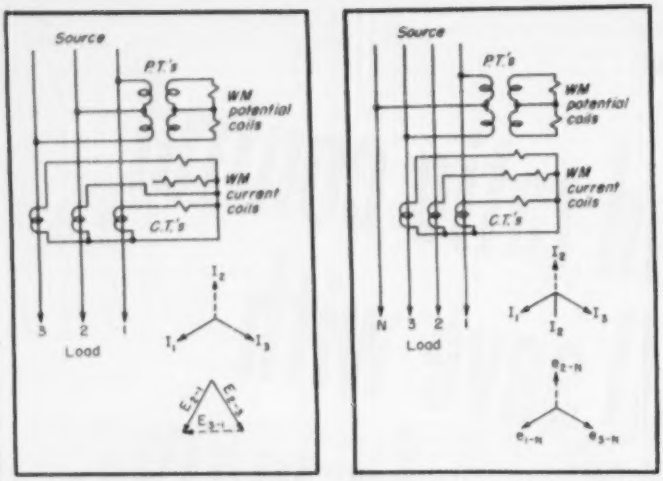


WATTMETER EQUIPMENT which by reconnection can be used for a 3-wire system (left) that is to be changed to a 4-wire system (right). For the 3-wire connection the middle current circuit of instrument is left out of circuit and no change of instruments is needed

Metering Equipment Suitable for 3-or-4-Wire Systems

H. S. EDGERLEY
Switchgear Division
General Electric Co
Philadelphia, Pa.

A METHOD is outlined for selecting watt measuring equipment to be installed on a 3-ph feeder system which is to be changed over later from a 3-w to a 4-w circuit. The method provides for wattmeters, watt-hour meters, associated current and potential transformers to be used without change merely by reconnecting them.

When a feeder circuit is changed from 3-w to 4-w operation the current rating usually remains the same and the voltage and kva are both increased 1.73 times. Middle current coil of the wattmeter is connected when the instrument is used for power measurement of 4-w circuits.

Accompanying diagram shows metering equipment for a 3-w system which can be reconnected for a 4-w system. The wattmeter used here has two elements each with two current coils and one potential coil. Two of the current coils, one in each element, are internally connected in series for use in phase 2. However the same current transformers are used for both 3-w and 4-w connections since the line current does not change. Three current transformers, while not needed for 3-w metering, are now recommended and usually supplied for adequate protective relaying of ungrounded 3-w circuits.

The equation for the 3-w connection is:

$$W = E_{3-1} I_1 \cos 30^\circ + E_{2-1} I_2 \cos 30^\circ$$
$$= 0.866 (E_{3-1} I_1 + E_{2-1} I_2)$$
$$= 1.73 E I$$

The equation for the 4-w connection is:

$$W = e_{1-N} I_1 + e_{3-N} I_3 + e_{1-N} I_2 \cos 60^\circ + e_{3-N} I_2 \cos 60^\circ$$
$$= e_{1-N} I_1 + e_{3-N} I_3 + 0.5 e_{1-N} I_2 + 0.5 e_{3-N} I_2$$
$$= 3eI \text{ or } 1.73 EI$$

where W = watts, E = phase-to-phase volts, I = line current, and e = phase-to-neutral volts and equals $E/1.73$.

Since by both equations $W = 1.73EI$, the wattmeter readings are proven to be identical in either case. In this arrangement the wattmeter scale is selected on the basis of the 4-w connections so that during 3-w operation, readings will be in the lower portion of the scale.

Mechanization Cuts Time for Rewriting Meter Sheets

RUSSELL W. URTON
Supervisor, Customers Billing Dept
The Dayton Power and Light Co
Dayton

THROUGH punched card equipment The Dayton Power and Light Co has realized many advantages in the rewriting of meter sheets. Under the previous method all pertinent information with the exception of name and address was transcribed by hand. Now, in addition to name and address the following information is transcribed by machine:

1. Account number
2. Previous meter reading index and consumption
3. Meter numbers
4. Gas furnace symbol
5. Code numbers for district, town, tax, revenue class and rate.

In addition to the improved appearance of the sheets, there is positive proof of accuracy of billing information compared to the old meter sheet. Mechanization of rewriting has, also effected considerable economy over hand posting.

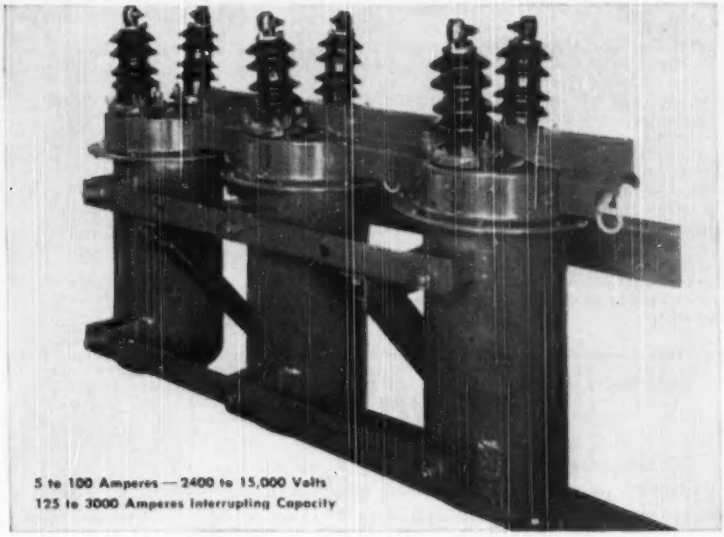
Positive alignment and fast printing is made possible by using continuous form sheets.

By this method the rewriting work has been staggered on a monthly basis eliminating the necessity of employing a large group of extra and inexperienced people periodically. Such a practice naturally tends to add to the normal probability of error.

Mechanical rewriting of meter sheets can also be synchronized with rerouting and the installation of a continuous account numbering plan to eliminate the manual transcription of account numbers to the old meter sheets. This is accomplished by use of master transfer cards in which are punched both old and new account numbers. Both numbers are then printed on the new meter sheets at the time of rewriting and thus carry complete cross reference to the prior sheets which are bound in the old account number sequence.

new TYPE FR-3

THREE-PHASE AUTOMATIC RECLOSER



5 to 100 Amperes — 2400 to 15,000 Volts
125 to 3000 Amperes Interrupting Capacity

General Electric's new FR-3 three-phase relayed automatic recloser extends the many advantages of the G-E Type FR-1 single-phase recloser to three-phase operation for rural distribution systems.

SIMPLER—Three FR-1 single-phase reclosers of the design that has been time-proven in service have been combined as a single unit designated Type FR-3. Thus . . .

INTERCHANGEABLE PARTS greatly reduce maintenance costs. As the FR-3 is essentially three FR-1 single-phase units, it's necessary to carry in stock parts for only *one* type of recloser.

COMMON LINKAGE ties together the lock-out mechanism of the three reclosers, thus assuring positive operation. Having three reclosers working as a unit eliminates the hazard of burning out three-phase loads by one phase locking-out while the other two phases remain closed.

INTERMITTENT FAULTS cause the three reclosers to operate independently, as a single-phase recloser.

PERMANENT FAULTS in any one phase will automatically lock-open all three reclosers. Close one and you close all three.

THREE SEPARATE TANKS—instead of one big tank—greatly reduces the possibility of phase-to-phase faults, and thus further improves your service continuity record.

For complete information on the General Electric Type FR-3 recloser ask your G-E Sales Representative for a copy of GEA-5466, or write to ***Apparatus Department, General Electric Company, Schenectady 5, New York.***

GENERAL ELECTRIC

Spectral Energy Distribution Curves Of Fluorescent Lamps

WILLARD ALLPHIN
Commercial Engineer, Sylvania Electric Products Inc, Salem, Mass.

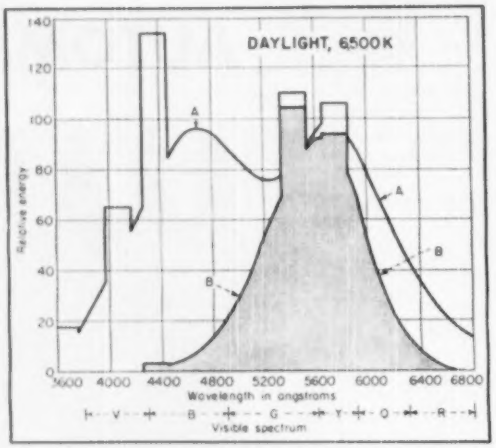
Curves show the spectral energy emitted at each wavelength for five fluorescent lamps, each of a different color temperature.

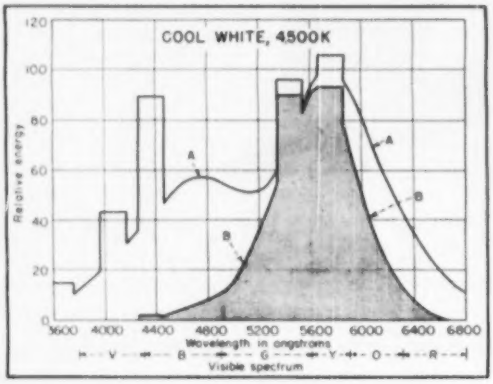
On the (A) curves, the highest point has been placed at 100 on the relative energy scale, and all of the other values for the particular curve relate to this point.

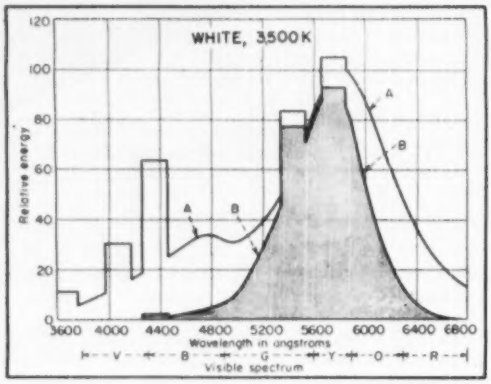
The (B) curves represent the relative energy from the individual lamps as seen by the human eye. Under these curves the area is shaded.

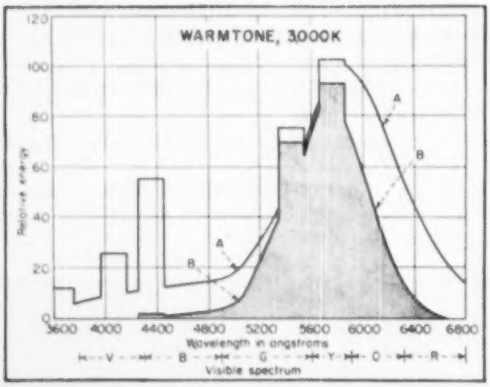
For convenience, the wavelength ranges of color bands (violet, blue, green, yellow, orange, red) in the visible spectrum are indicated on the horizontal scales of each graph.

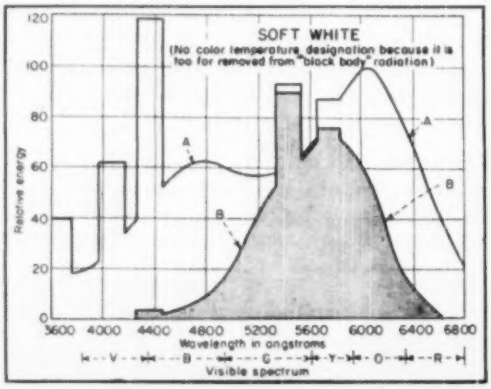
In Fig 1 to 5 energy from the mercury lines is shown added to the continuous spectrum from the fluorescent phosphors. For convenience in representation, each line has been assigned an arbitrary width of 200 Angstroms, centered about the actual wavelength involved. It will be noted that the energy from mercury lines is small compared to that from the continuous radiation.


DAYLIGHT, 6500K
Relative energy
Wavelength in angstroms
3600 4000 4400 4800 5200 5600 6000 6400 6800
V B G Y O R
Visible spectrum


COOL WHITE, 4500K
Relative energy
Wavelength in angstroms
3600 4000 4400 4800 5200 5600 6000 6400 6800
V B G Y O R
Visible spectrum


WHITE, 3500K
Relative energy
Wavelength in angstroms
3600 4000 4400 4800 5200 5600 6000 6400 6800
V B G Y O R
Visible spectrum

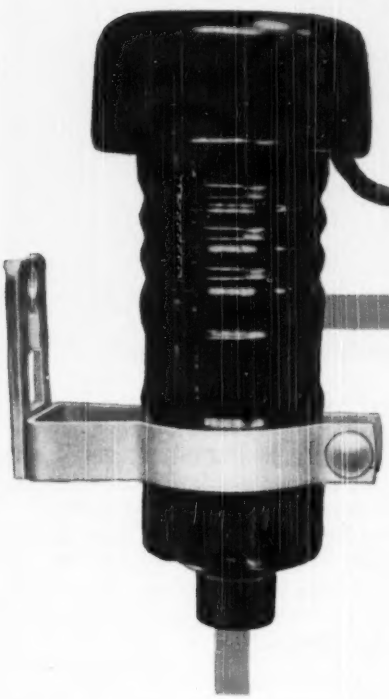

WARMTONE, 3000K
Relative energy
Wavelength in angstroms
3600 4000 4400 4800 5200 5600 6000 6400 6800
V B G Y O R
Visible spectrum

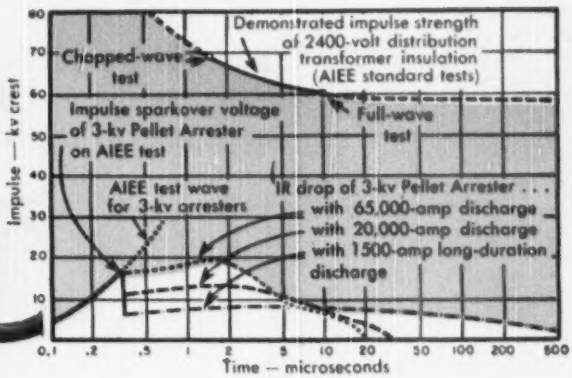

SOFT WHITE
(No color temperature designation because it is too far removed from "black body" radiation)
Relative energy
Wavelength in angstroms
3600 4000 4400 4800 5200 5600 6000 6400 6800
V B G Y O R
Visible spectrum

No other distribution arrester

Protects

...so well





The G-E Pellet arrester is also "taps" for endurance. It is the only distribution arrester with series gaps sealed in dry, inert nitrogen (N_2)—keeping gap electrodes bright as new during years of service operation. Pellets, themselves, are of lead peroxide—a distinctive valve element, self-protecting against service moisture—unaffected by condensation, or humidity. Pellet arresters have large discharge capacity—they withstand easily the AIEE and NEMA standard 65,000 ampere impulse test.

This graph, made from actual volt-time and ampere-time cathode-ray oscillograms, demonstrates the protection afforded distribution transformers by the G-E Pellet arrester. No other distribution arrester limits lightning voltages so low for small, medium or high lightning currents.

This co-ordination chart is based on the 3-kv arrester protecting a 2400-volt transformer. Similar charts for Pellet arresters of higher ratings protecting higher voltage class transformers demonstrate the same advantages in unequaled margin of safety in protection. This *extra protection* results from the combination of low sparkover voltage and exceptionally low IR drop, that together hold lightning voltages to lower levels than does any other distribution arrester.

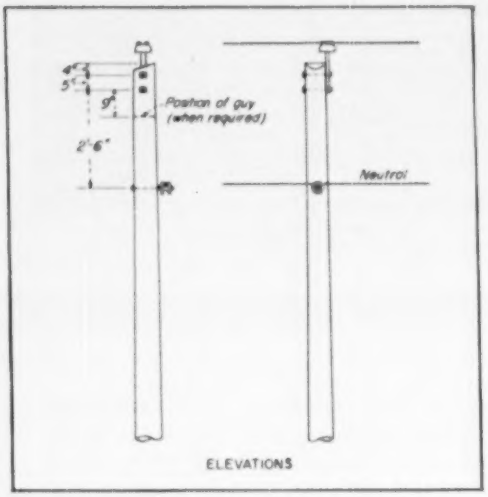
You buy better protection when you buy Pellet arresters!
The Quality-Standard of the Industry for more than 25 years.

Apparatus Department, General Electric Company, Schenectady 5, New York.

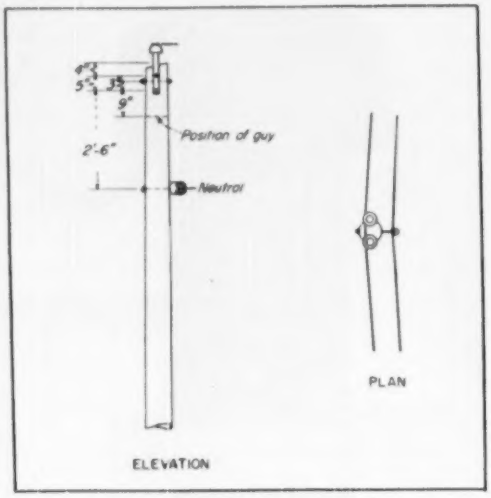
GENERAL ELECTRIC

Guide to Rural Vertical Construction For 2-Wire Primary Circuits

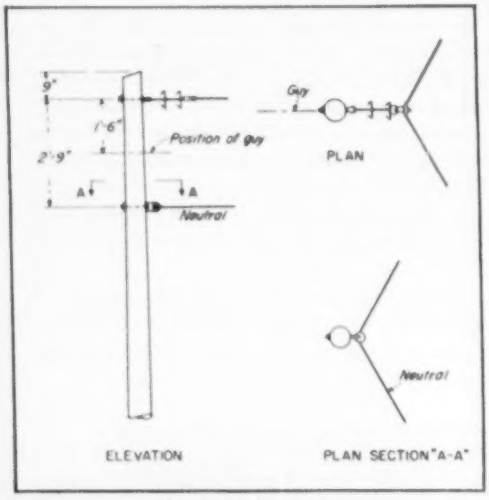
Methods of running 1-ph, 2-w neutral grounded circuits of copper and composite copper conductors at angles from 0 to 90 deg; an adaptation from rural distribution standards of Gulf States Utilities Co, Beaumont, Texas



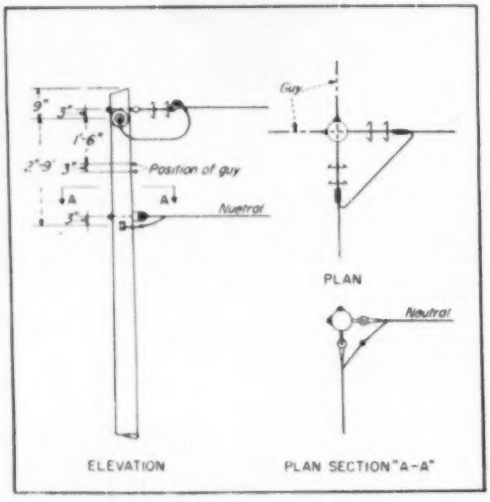
0 to 5 deg angle



5 to 30 deg angle

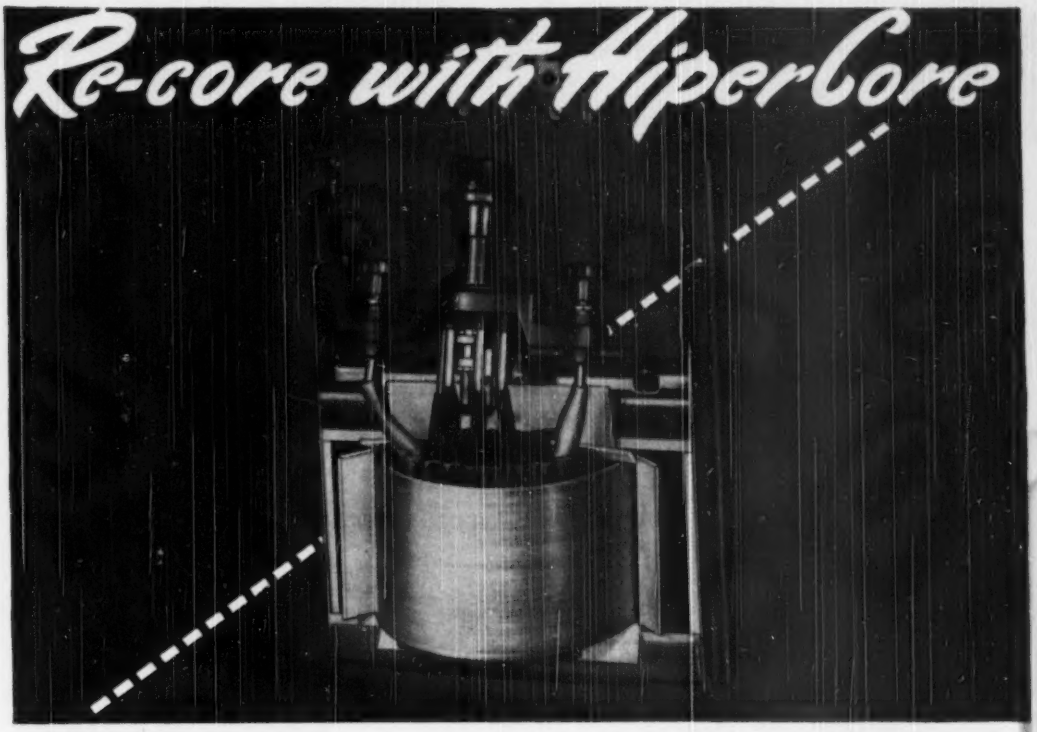


30 to 60 deg angle



60 to 90 deg angle

Re-core with HiperCore



Modernize your burned-out or old transformers ...increase their Kva ratings

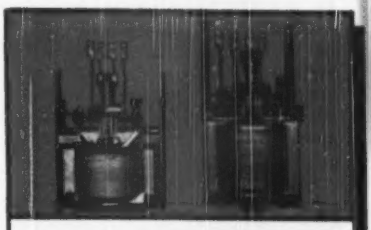
- **Save up to 30% of new transformer cost**
- **Increase 1½ Kva transformers to 3 or 5 Kva**
- **Get "new transformer" loss and other performance guarantees**

By a simple re-coring operation your burned-out or old transformers can be made into transformers that are new and up-to-date in design and performance. Many old transformers were contained in tanks larger than those required for HiperCore transformers, so it is possible to install HiperCore core-and-coil units of the next larger Kva rating in the old tanks. Frequently, 1½ Kva transformers may be changed to 5 Kva, and 3 Kva transformers may be changed to 7½ Kva. It is possible to save up to 30% of the cost of new transformers.

HiperCore core-and-coil units supplied for replacement purposes are the same as those used in new Moloney transformers and are not special "replacement" units having higher losses and poorer voltage regulation.

You can re-core these transformers yourself or have an authorized Moloney Repair Shop do the job for you. For further information write Moloney Electric Company, St. Louis 20, Missouri.

MEEO-2



5 Kva HiperCore core-and-coil unit (left) and 5 Kva unit typical of older designs (right). Smaller size of HiperCore unit, achieved by use of wound cores made of high permeability, oriented, silicon steel, permits use of larger Kva ratings in old tanks.

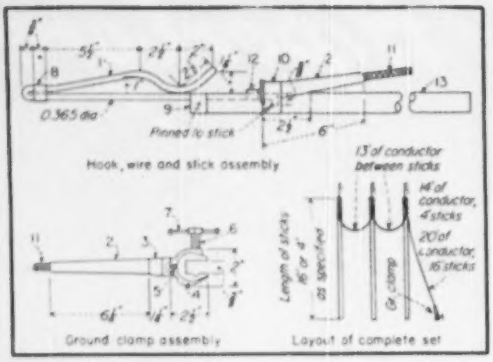
MOLONEY MANUFACTURES . . .

Step Voltage Regulators • Regulating Transformers • Load Ratio Control Transformers • Unit Substations • Load Center Transformers • Power Transformers • HiperCore Distribution Transformers (Conventional and CSP Types) • Askarel (Non-inflammable Liquid) Cooled Transformers • Network Transformers • Air-Cooled (Class A and Class B Insulated) Transformers • Constant Current Street Lighting Transformers (Packaged Unit and Standard Types) Submersible Type Transformers • Capacitors

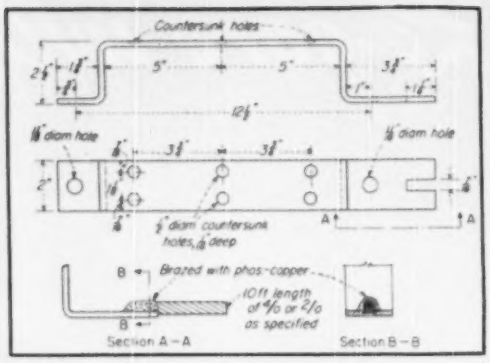
MOLONEY ELECTRIC COMPANY

Sales Offices in all Principal Cities

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONTARIO, CANADA


Hook, wire and stick assembly
Pinned to stick
13' of conductor between sticks
14' of conductor, 4 sticks
20' of conductor, 16 sticks
Length of sticks 16' or 8' as specified
Ground clamp assembly
Layout of complete set

GROUNDING STICKS for use on phase conductors, also details of hook and ground clamp assemblies. Numbered parts refer to items in the tabulated material list which includes description and quantity



STRAP DESIGNED to allow three independent grounds in switchhouse, with oil circuit breaker and bus structure. Material is 2 x 1/4-in. copper bus bar 20 1/2-in. long, to be bolted to a steel surface

Standard for Protective Grounding of Equipment

J. R. INGRAM
Relay Supervisor
New England Power Service Co
Worcester, Mass.

NEW ENGLAND Electric System's standard protective device for grounding equipment, while being serviced, consists of flexible No. 2 rubber-covered wire with a clamp on the end to be grounded and three hooks along its length fastened to short phase sticks. In the past it was the practice to attach the grounding end clamp to the supporting steel legs for oil breakers or any similar steel available near the equipment to be grounded. In many cases this steel was painted, and the ground clamp pressure was relied upon to give proper connection.

With short-circuit currents growing on the system, trouble was apprehended if the paint film was not adequately pierced or if the two sides of the steel member were insufficiently parallel to give dependable pressure. Accordingly, items to be grounded were equipped with a copper pad to which ground sticks could be attached. Tests made at full thermal capacity of the ground cable (about 10,000 amp) confirmed the value of this new practice. The reason—the ground set attached to the painted surface was badly damaged at the point where the clamp met the painted steel, while no damage occurred to the set attached to an unpainted surface.

As a result of these tests, it was decided to bring the grounding wire from the grounding network far enough up the equipment to allow the ground clamp to be attached directly to copper. To do this a ground strap has been devised which is brazed directly to the end of the 4/0 copper coming from the ground network. This strap is made of 1/4-in. x 2-in. copper, so shaped that when bolted to a steel surface, room is provided for attaching three ground clamps. Depressions machined in the surface of the copper prevent movement of the grounding clamp in the event of carrying heavy current. This ground strap is being installed on all new jobs and is being added to as many old installations as practicable.

MATERIAL LIST

Item No.	Description	Quant. Req'd.
1	Copper hook, 2/0 solid Phono. Elec. 28 in. long	3
2	Sleeve, 60% rubber	6
3	Ferrule and manganese bronze	1
4	Ground clamp manganese bronze	1
5	Allen set screw, 1/4 in.—20x 3/8 in. long	1
6	Cap screw, 1/2 in.—13x1 1/4 in. long	1
7	Handle, 5/16 in. diam rod, both ends flattened	1
8	Sleeve, copper, No. 2, 2 1/4 in. long	3
9	Brass tubing, No. 21 gage, 1 1/4 in. O.D., 1 in. long	3
10	Strip copper, tinned, No. 26 gage, 1 in. wide	3
11	Wire, No. 2-259 strand copper, 60% rubber	46 ft.
12	Sleeve, copper, 1/0, 1 in. long	3
13	Stick, white birch or maple, 1 3/16 in. diam	3
14	Tapered copper plug, 1/4 in. diam, 1 1/4 in. long	1

Tender Trucks Save Time and Money

W. T. HESS
Chief Engineer
Louisiana Power & Light Co

IN looking about for methods of increasing construction efficiency, utility men may well examine the results of an experiment tried by Louisiana Power & Light Co. They are using pick-up trucks as auxiliary or tender trucks assigned to construction crews. In addition to the regular heavy construction trucks, usually 2 or 2 1/2 ton, several crews were recently equipped with 1/2-ton pickup trucks.

The tender truck has proved particularly valuable in saving loading time. One foreman recently estimated that he saved at least 30 min of his crew's time when loading transformers in the construction yard with a pole derrick. Frequently, a great deal of time can be saved by loading the small truck with materials for the job at hand while the large truck is picking up the necessary poles. This is especially true when the poles are stored at a point some distance from the construction barn.

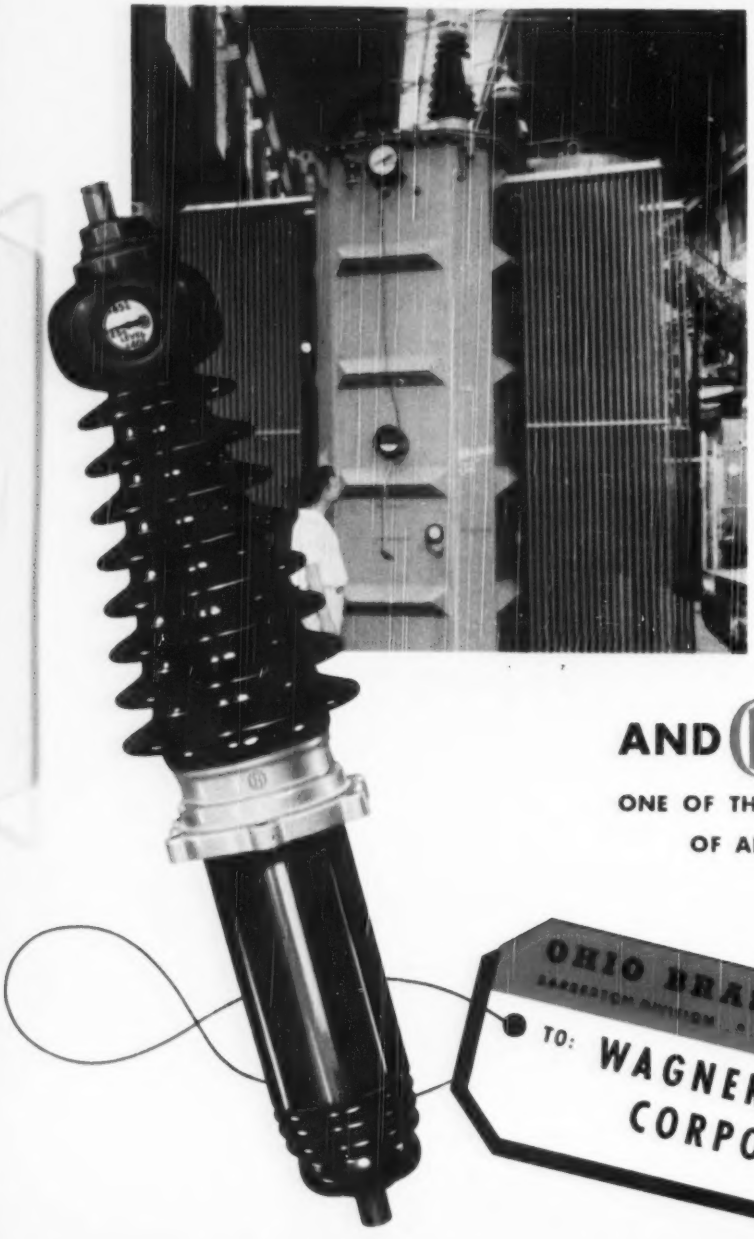
Many small jobs can be handled

Again, O-B was the
CHOICE OF INSULATORS
. . . for 50,000 good reasons!
In 1928 the original portion of this 132-kv system was built, soon totaling approximately 90 miles. In the intervening 23 years, the network has almost quadrupled in circuit-miles, every tower of which is equipped with O-B suspension insulators. Nearly a quarter of a century's experience with upwards of 50,000 insulators leaves little room for sales arguments--there's nothing we can tell this power company about O-B insulator performance they don't already know. That's why it's significant that O-B again went up on this recent extension!
This is just one more case to prove that the more you know about O-B, the more it becomes your CHOICE OF INSULATORS.

Ohio Brass

MANSFIELD, OHIO, U. S. A.

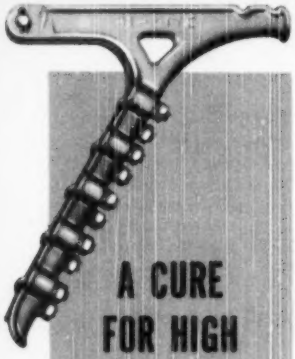
HI-TENSION NEWS *Junior*



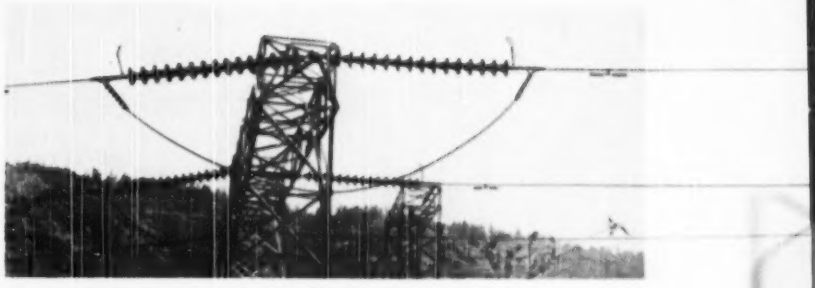
One of a bank of four Wagner transformers now going into service and, like many other Wagner units, equipped with O-B bushings as another step toward highest reliability. Size and general make-up of these transformers are indicated by a few specifications supplied by the Wagner Electric Corporation: "Each unit rated at 5,000 kva, single phase, 60 cycle, 39,850 69,000 "Y" to 12,000 volts. Oil filled, self cooled, and equipped with vertical inert gas oil seal tank for oil preservation. Among other refinements are magnetic oil level indicators with low oil level alarm contacts, dial type oil temperature thermometers with alarm contacts, combination pressure and vacuum gauges . . ."

AND (B) BUSHINGS

ONE OF THE FINEST COMPONENTS OF ANY TRANSFORMER



A CURE FOR HIGH RESISTANCE JUMPER JOINTS



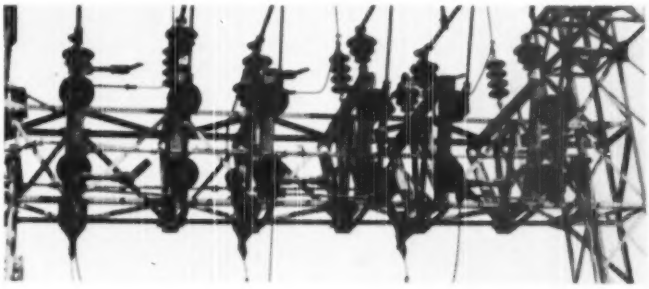
"Straight-through" stringing practice on high voltage jumpers eliminates the usual splice--a potential source of burn-down trouble after a few years of operation. With O-B deadend clamps, such jumpers are easily built. These clamps also give you: (1) adequate grip and strength, (2) easy installation without special tools or equipment, (3) ability to inspect the security of grip at installation and during later maintenance.

Above everything else, O-B high voltage deadend clamps make possible a condition approximating a continuous conductor from end to end of the line. They cost less, install inexpensively, and save a lot of later trouble.

You can specify how well a station insulator is built

. . . but not how well it works!

Study the rigid industry specifications relating to station type insulators and you will probably decide they're all alike, no matter who makes them. This is very largely true. They're all alike *when new*. But they don't *stay new!*



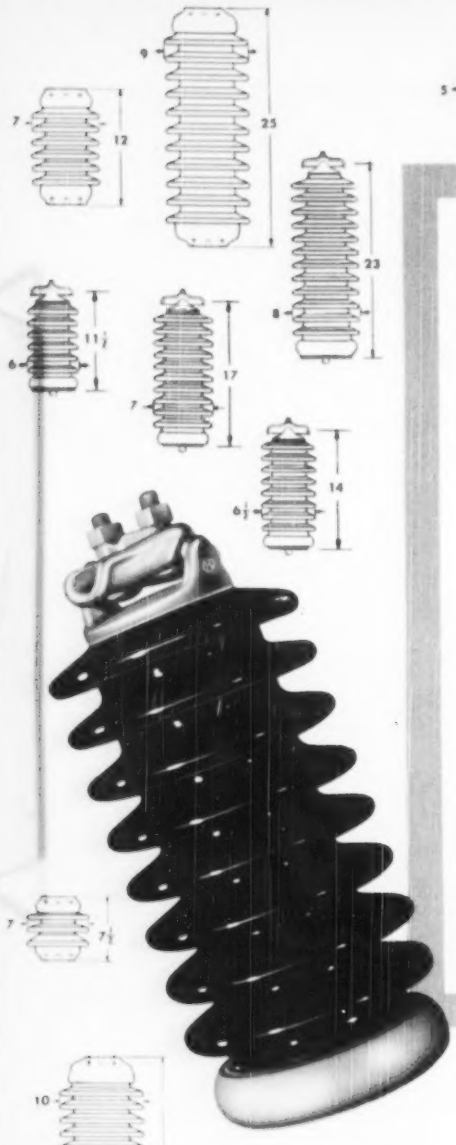
No specification covers ultimate life or long-time performance. That's where the difference comes in--that's where the manufacturer enters the picture. And, speaking of manufacturers, here's something worth remembering. Stations throughout the world have been insulated with O-B over the past 35 years. The large percentage of "repeat installations" called for by fully satisfied users indicates that O-B station insulators have adequately proved *there is a difference*--strongly in their favor.

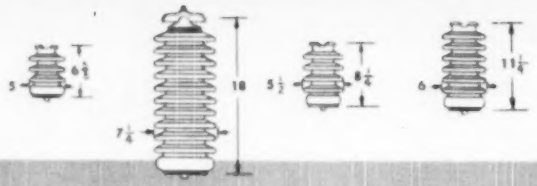
Ohio Brass

MANSFIELD, OHIO, U. S. A.

OB

HI-TENSION NEWS Junior



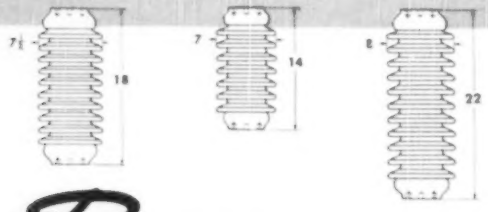


Whatever Post You Need... it's in O-B's Complete Line

With the completion of new plant facilities totaling well over a million dollars--a large share of which was devoted to departments manufacturing post type insulators--Ohio Brass is now producing, selling, and stocking a complete post series in both line and station type. This greatly enlarged production has been combined with eleven years of post manufacturing experience to make the present O-B post a major item in the O-B insulator line.

From O-B you have a free selection of any insulator type to suit your preference or standards--each brought to the highest possible degree of modern refinement and maintained at this point by unequalled laboratory and research facilities. O-B is in the unique position of being totally impartial in the application of technical development, as well as in the matter of making the best recommendations to prospective purchasers.

Your O-B representative will supply full information on the application of O-B posts either to your lines or stations. Discuss this matter with him, or refer your inquiry direct to the home office.



Ohio Brass

MANSFIELD, OHIO, U. S. A.

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most efficiently by three or four men, and the pickup truck provides the mobility required when the crew is split. On larger jobs the small truck is just as valuable a timesaver.

It was found that the light truck, under the proper supervision, could be used for sagging wire in terrain that prohibits the use of the heavier construction truck.

The light truck is safer for crew members to ride in because of the clear bed. In the event of an injury on the job, the injured man can be moved much more rapidly and comfortably in the light truck.

In the more concentrated distribution area, the light truck is better fitted to cope with urban traffic than the more bulky construction truck. It can carry transformers up to 100 kva easily, and the cost of operation is much lower than that of the larger truck.

Louisiana Power & Light Co has several of these trucks now in service and plans to use more in the future.

•

Insulating Oil Sample

Transformer_____
OCB_____
Location_____
Serial No._____
Type_____ Make_____
KVA_____ Date_____
Capacity in Gals_____

This bottle has been cleaned and dried in the Laboratory.

Do not use first oil drawn from sampling valve. Discard one qt., before taking sample. Draw from bottom if only one sample taken.

Do not touch or breath on oil, top of bottle, or inside of cap while sampling. Do Not Contaminate by using any transfer vessel or funnel.

Replace cap immediately.

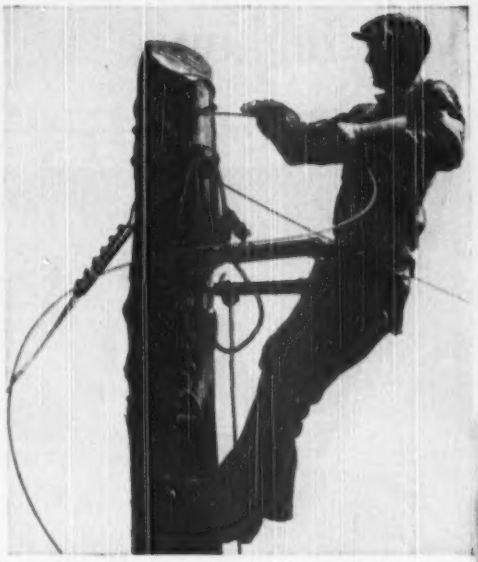
Portland General Electric Co.
Testing Dept. 12-1-48

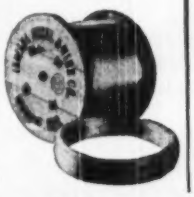
LABEL adopted by Portland General Electric for standard oil sampling bottle. Directions aid crews in getting valid samples for tests

Clean, Labeled Bottles Insure True Oil Sample

TO PREVENT contamination and to insure consistently dependable samples for routine maintenance testing, Portland General Electric has adopted a standard bottle, label, and carrier for insulating oil samples.

Has What It Takes





For Guys, Messenger and Overhead Ground Wire

EXPERT linemen know, when they use *Crapo* Galvanized Steel Strand, that it will meet every requirement the job demands. For *Crapo* Galvanized Strand "has what it takes" — *strength, ruggedness, workability, long-life.*

These essential characteristics, combined with ever important ECONOMY, make *Crapo* Galvanized Strand first choice for guys, messenger and overhead ground wire. The superior tensile strength of the steel is utilized to fullest advantage in each size and grade. The heavy, ductile, tightly-adherent galvanized coating — applied by the famous *Crapo* Process — provides dependable protection for the steel, prolongs the expectant life of the strand.

The all 'round reliability and overall economy of *Crapo* Galvanized Strand are matters of record with leading strand users. Such records contain ample and significant proof of the long life and low annual cost of this strand in service.

Available for Prompt Delivery

There is a size and grade of *Crapo* Galvanized Strand for every practical need. Consult the distributor of *Crapo* Galvanized Products near you or write for further information!

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

Crapo GALVANIZED STEEL STRAND

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

All of these sizes, shapes and types of mounting are made available to you in Westinghouse Panel Instruments—the most complete matched line in the industry. For all your panel instrument requirements refer to Westinghouse Catalog Section 43-300—or ask your nearest Westinghouse Representative.

Slash Instrument Inventory!

★ **The most complete line**

★ **Meets A.S.A. standards**

★ **Shipments in 10 days**

Cut overhead on instruments. Maintain production without costly stocks.

Westinghouse now offers the most complete matched line of panel and switchboard instruments in the industry . . . every one built to the rigid standards of "The American Standards Association". Shipment can be made to meet practically every electrical requirement within ten days of receipt of order at the factory.

Westinghouse Instrument Specialists are ready to help you plan. These men have nationwide experience in solving instrument application problems of all kinds. For application help on instrument problems, phone, write or wire your nearest Westinghouse Representative, or Westinghouse Electric Corporation, 93 Orange Street, Newark, N. J.

J-40390-A

Specify Westinghouse *- get more for your instrument dollar!*

Westinghouse

INSTRUMENTS

Specify **ACCURATE**
FRICTION AND RUBBER
***ASTM TAPE**

1. NATIONWIDE WAREHOUSE STOCKS FOR SERVICING EVERY LOCALITY
2. STRATEGICALLY LOCATED REPRESENTATIVES RENDER FAST, PERSONALIZED SERVICE

For *SUPER SERVICE* on tape . . . in any quantity, large or small, contact the nearest *ACCURATE* representative

☆California—F. J. AIBEY COMPANY
1513-1515 S. Mateo St. L. A.
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☆Illinois—GEORGE BUTLER CO.
1015 W. Washington Blvd., Chicago
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Texas—WYNNE SHOOTS CO.
705 E. 13½ Avenue, Houston
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2nd Unit Santa Fe Bldg., Dallas
Virginia—W. E. EPPERSON
406 Travelers Bldg., Richmond
☆Washington—ELECTRIC AGENCIES
618 Second Ave., Seattle
Wisconsin—GEORGE BUTLER CO.
1015 W. Washington Blvd., Chicago

☆ CONSIGNED STOCK

*** ACCURATE SPECIFICATION TAPES**—Rubber and Friction—exceed ASTM designations: D119-48T and D69-48T.

WRITE FOR FREE SIX PAGE FOLDER — Your copy is now ready. Fully describes the Accurate quality line of standard and specification friction and rubber tapes. Please write on company letterhead to ACCURATE MANUFACTURING CO., GARFIELD, N. J.

ACCURATE TAPE

The label shown is affixed to one-pint bottles which have been cleaned and dried in the laboratory. Crews likely to be doing oil sampling carry these bottles at all times.

Oil samples in any other containers are refused by the laboratory. The drastic effect of even minute contamination on interfacial tension tests makes such extreme care mandatory in obtaining valid samples.

•

INSULATOR CLAMP, displayed by Frederick Esch, and winch line make fastening of insulator strings to tower easier. Grooved pulley carries winch line over the cross-arm

Insulator Strings Handled By Clamp and Winch Lines

C. W. BASHORE
Supt Overhead Lines
Indianapolis Power & Light Co
Indianapolis

An insulator clamp and winch line have been combined to take some of the heavy work out of handling long strings of insulators during construction of 132-kv lines. The clamp was made in the shops of Indianapolis Power & Light Co.

In operation, the clamp is fitted around the collar of the fifth insulator from the top in a string of nine insulators. After the conductor is strung, raised to the tower and marked for sag, it is fastened-in on an insulator string. Winch line is fastened to in-

LOOK HOW

SYLVANIA

Helps You Build Fluorescent Lighting Sales!

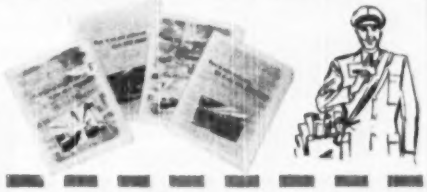
1 **Prospects by the Million** are learning about Sylvania "Fluorescent at its finest" through big color ads in these leading *National Publications.*

They're reading about Sylvania's complete packages of light . . . finest possible fixtures and lamps . . . from one manufacturer. They're learning about the new Sylvania Triple-life Fluorescent Lamps . . . with an *average rated life 3 times that of previous lamps* . . . and how Sylvania field-tested more than 11 million of these lamps to *prove* their superiority.

2 **Every Important Market Covered** by comprehensive advertising programs in scores of influential *Trade and Business Papers.*

Thus, the men who make the decisions are kept constantly informed about Sylvania fluorescent lighting efficiency and dollar-saving advantages. Special campaigns are directed to executives in plants, offices, stores, and institutions, as well as to architects, contractors, and lighting engineers.

3 **Attention-getting Direct Mail Campaigns** also are telling and selling thousands of prospects in factories, offices, schools, and stores. These mailings are tied in with the Trade and Business Paper ads . . . they are pin-pointing and selling specific prospects and customers.



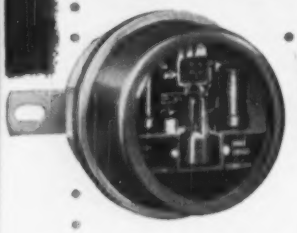
4 **Get this Sylvania Selling Plan** . . . it gives you full details about Sylvania's big advertising programs. Enables you to coordinate your local efforts with nation-wide campaigns. Shows how to turn Prospects into Profits. Mailed to you FREE. Send for your copy of "Your Springboard to Greater Sales", FL-405, today! Address Sylvania Electric, Advertising Dept. L-2403, 500 Fifth Avenue, New York 18, N. Y.

SYLVANIA ELECTRIC

FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, SIGN TUBING; LIGHT BULBS; PHOTOLAMPS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES

Fisher-Pierce
Photoelectric Controls

CUT
STREET LIGHTING
COSTS



Fisher-Pierce Photoelectric lighting Controls have a continuous record of low-cost service by more than 600 electric utilities in more than 17,000 installations.

Fisher-Pierce should be on *your* "Standards" list. Controls for examination and test can be shipped immediately from stock.

Approved by street lighting engineers and maintenance men throughout the world, Fisher-Pierce units offer a simplified Photoelectric relay for control of multiple or series street lighting systems. Fisher-Pierce controls give you long tube life (20,000 hours or more), easy servicing, (plug-in chassis construction), *no resetting after power interruptions*. In other words, exceptionally *low maintenance costs*.

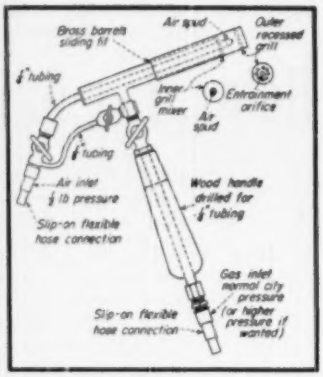
Models available for direct-connected lamp loads up to 3000 watts, for pilot-wire relay systems, and oil-switch controls for series systems.

Ask for Bulletin 63300

The FISHER-PIERCE COMPANY, INC.
82 CEYLON ST., BOSTON 21, MASSACHUSETTS

sulator clamp and takes most of load from lineman while string is being bolted in place on the tower. Man on tower has to handle only four insulators instead of the entire string during the bolting-on operation.

•



GAS-AIR TORCH has adjustable flame characteristics to meet wide range of service. Burns city gas at normal pressure

How to Make Adjustable Flame Gas-Air Torch

AN eastern utility engineer developed the illustrated torch, which burns city gas, with a flame range from a small "cool" needle jet to a hot, fast needle flame or a spreading flame as required. It is usable in jobs differing as widely as soldering the stylus on a recording instrument or covering a door with galvanized sheet iron. Only adjustments needed are in gas and air use. It is effective in work such as soldering connections and lugs on wires without burning insulation; in intricate capillary soldering; softening putty on windows without breaking glass or burning sash; heating small parts for tempering; and for aluminum soldering without the flame making contact with area involved.

Components used were ¼-in. compression couplings; copper tubing and compression cocks (from discarded thermo controls on radiators); ¼-in. tubing from a discarded pilot on a storage water heater; inner and outer grills made from copper rivet burrs; gas flat iron spud for the air spud; hose nozzles from old fishtail lava tip holders; wood handle from a hardware stock; brass barrels from old pieces of brass pipe, one turned down in lathe to slip inside the other.

5 REASONS WHY FARGO Automatic Splices Put You in Line for Bigger Time and Labor Savings

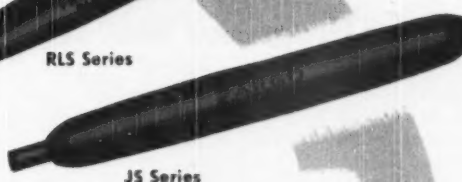
① **EASILY INSTALLED**—they're *fast* . . . save Linemen's time . . . and ease the job for the entire crew.

② **NO TOOLS REQUIRED**—because they're *automatic*.

③ **SAFER TO USE**—because they require no tools .

④ **FARGO "ONE-PIECE" JAW CONSTRUCTION**—is stronger and *permanent*.

⑤ **LOWER OVERALL COST**—attested by wide and trouble-free use.



THE LS SERIES is the standard, reclaimable type, available in sizes from 8 strand through 500 MCM.

THE RLS SERIES is a reducing splice, available in all commonly used conductor combinations.

THE JS SERIES is similar to the standard splice in operation and is used where reclaimability is not important. Limited to most popular wire sizes—and lower in cost.

THE SFT SERIES is an automatic insulated splice used for series street lighting, secondary networks, primary breaks for cutouts and regulators.

THE AMS SERIES is an automatic splice for use on copperweld messengers. Available in sizes from 3 No. 9's to 9/16".

Remember to ask your Line Material Engineer about the advantages of the "One-Piece" Jaw.

FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N.Y.

Distributed by
LINE MATERIAL COMPANY
Milwaukee, Wisconsin

LM

LOAD BUILDING

RESIDENTIAL • RURAL
COMMERCIAL • INDUSTRIAL

AT THE "KICK-OFF" breakfast E. N. Avegno, Manager, Dealer Division, New Orleans Public Service Co, acted as toastmaster, outlined details of the activity and introduced the guest speaker. Others seated at the head table were distributors in New Orleans and vicinity

Home Freezer "Gold Rush" Strikes Pay Dirt

NEARLY 300 home freezers were sold in a "Gold Rush" Campaign sponsored by New Orleans Public Service. The entire Home-Freezer industry of the area participated, including frozen food dealers who made a special price on a supply of frozen foods for each purchaser of a new freezer.

Opening of the campaign was signaled by a "kick-off" breakfast meeting which was attended by approximately 300 home-freezer dealers, salesmen and other members of the industry. Three other breakfast meetings during the campaign had an average attendance of more than 200.

Results of the campaign, which lasted only six weeks, were accepted as proof that home freezers can be sold in New Orleans if salesmen get out and sell. It was expected that consumer interest in home freezers, and sales enthusiasm built up during the campaign will continue.

Several features contributed to success of the campaign. Prizes for salesmen in a "Pot of Gold" drawing, awards to dealers for best window displays, and prizes for salesmen who developed the best sales presentations all stimulated the activity.

Each dealer contributed $2 in a special "Pot O' Gold" for each freezer sold through his store. Money in the pot was divided into NUGGETS of values varying from $1 to $10. At the last three breakfast meetings of the campaign, successful "Sales Prospectors" were entitled to select one NUGGET from the pot for each freezer sold.

Dealers exhibiting the three best home freezer window displays were awarded prizes by New Orleans Public Service as follows:

First	$25
Second	$15
Third	$10

In addition, the displayman designing the first-prize-winning window was awarded $15.

To stimulate development of presentations, individual salesmen were offered prizes for the best sales presentations. Material for sales talks was handed out at the initial breakfast meeting. Each salesman was invited to give a five-minute sales talk, and these talks were recorded. Winning sales talks were selected by a board of judges and then were played back at the final breakfast meeting. Sales-talk prizes were:

First	$40
Second	$25
Third	$20
Fourth	$15
Fifth	$10

To further stimulate consumer interest, home service personnel of the power company conducted a series of home freezer demonstrations. These demonstrations emphasized the convenience, economy, and other advantages of home freezers. Two demonstrations were at night; and on these occasions quiz programs were on the schedule. Prizes were awarded at all demonstrations.

Extensive Advertising

New Orleans Public Service also carried on an extensive advertising program through newspapers, billboards and on the radio. Wholesalers cooperated with dealers in advertising and promotional programs. The utility allowed $2 per freezer sold on advertising by dealers, provided the allowance did not exceed 25% of the advertising by the dealer.

On the company display floor one to three models of each make of home freezer sold in the city were kept on display throughout the campaign. Distributors exhibited freezers filled with frozen foods and had representatives on hand to demonstrate each make. Displays were so successful that the utility has decided to continue a home-freezer display on a permanent basis.

Dual-Control Phones Train Employees

HARTFORD (Conn.) Electric Light Co has established dual-control telephone facilities for training personnel newly employed in customer relations work. Under this procedure spot checkups of methods of dealing with customers or other inquirers can be made to insure correct telephone manners.

Training in courtesy, ease of manner, acceptance of conditions brought to the employee's attention and clarification of misunderstandings is given as needed to maintain good customer relations.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Don't be a FIXTURE PICKER!

They'll never find a "bargain in lighting" by "picking fixtures". Yet you meet hundreds like this every day. And so do we.

No *one* fixture will solve all lighting problems.

There are, in fact, literally thousands of luminaires engineered to do specific jobs. One may be the right answer—or it may take two or three.

Good lighting combined with practical economics takes the services of a qualified lighting engineer.

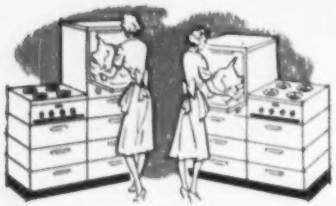
Whether you plan lighting, buy lighting or install lighting, the services of a Westinghouse lighting engineer are available to you. J-04280

Westinghouse

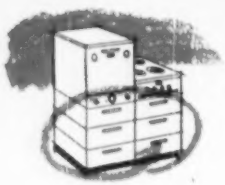
PLANNED LIGHTING PAYS

UNIVERSAL *presents* the first major advance!

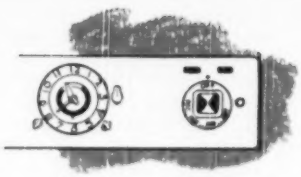
Here it is! The sensational *Select-a-Range* with the exclusive "Convenience-Level" oven!



NOW! RIGHT OR LEFT HAND OVENS! "Convenience-Level" can be set to any desired height, right or left, for tall or short people to eliminate back-breaking stooping, squatting and bending!



NOW! 100% MORE STORAGE SPACE! Increased storage drawer capacity provides more than twice as much utility space as conventional ranges! *All* your utensils are now at your fingertips!



NOW! SAVE TIME WITH AUTOMATIC COOKING! Automatic Clock starts and stops oven without attention. Automatic push-button Pre-Heat Control. Just set it ...then forget it. No watching or guessing!

in Electric Range Design in 25 years!

THE

Select-a-Range

IT'S NEW!

IT'S REVOLUTIONARY!

IT'S EXCLUSIVELY UNIVERSAL!

New markets for you! . . . Greatly *increased* turnover with *reduced* inventory! . . . Exclusive, dramatic "Convenience-Level" oven! . . . More sales through kitchen planning flexibility! That's why...

EVERY DEALER SHOULD HAVE THIS AMAZING NEW KIND OF RANGE IN HIS STORE!

1. The Select-a-Range gives you the widest range line in the industry. Now you can sell a range for the smallest cottage or the largest mansion . . . from minimum to maximum cooking requirements. Now you can sell the building market with a range designed and priced for any project . . . new building or modernization. Now you can sell the institutional market with a range big and flexible enough to meet requirements.

Here are new markets, broader markets never before open to you in range selling!

2. One Select-a-Range on your floor is all the inventory you need to do a complete selling job compared with 6 or 8 models of a conventional line. Instead of turning over your range investment four times a year, for example, Select-a-Range turnover is 24 times! Just one Select-a-Range gives you a line of more than 25 models!

Reduced inventory . . . increased turnover . . . equals greater range profit for you!

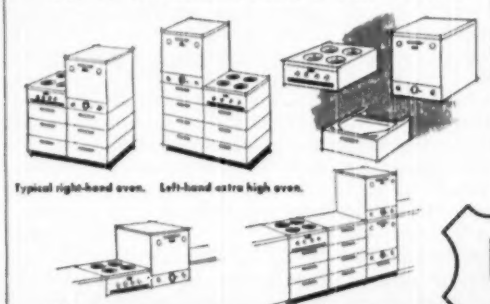
3. Select-a-Range is the *only* range with the much desired no-stoop "Convenience-Level" oven. Surveys show that over 25% of your customers want a *high* level oven. Now they can have it . . . it's exclusively Universal . . . a "Convenience-Level" oven at the height your customer selects . . . exactly as she wants it.

Here is a great sales advantage for you that no other range line can match!

4. Select-a-Range *multiplies* your opportunities to sell *complete* kitchens . . . 25 arrangements to meet your customer's most exacting whims. Your kitchen planning problems are simplified with fresh new designs by the nationally famous Royal Barry Wills . . . Select-a-Range models and other sales helps.

Call your Universal distributor today or write immediately to Landers, Frary & Clark for complete details. Be the *first* in your town with the sensational Select-a-Range!

OVER 25 VARIATIONS FROM 3 BASIC UNITS!



Typical right-hand oven. Left-hand extra high oven.

Minimum low cost arrangement. Double oven arrangement.

Royal Barry Wills

nationally famous small homes designer., has planned six new startling kitchens around the sensational Select-a-Range. Featured in Select-a-Range national advertising, they have also been included in your kitchen planning kit to help you sell!

UNIVERSAL

LANDERS, FRARY & CLARK, NEW BRITAIN, CONN.

"SIGHTSAVERS" contest announcement and entry blank was inserted in residential customer publication. Contest was announced in Oct. issue, and promoted further in Nov.-Dec. number

Prize Contest Promotes Certified Lamps

ABOUT one in 10 of all Monongahela Power Co residential customers, 14,661 out of 149,800, was persuaded to give action-taking thought to the lighting in their homes by means of a "Sightsavers" contest last fall. And, since multiple entries were allowed, about one in 6 of the 14,661 thought quite a lot more about it. Total entries were 17,057.

Employee's Contest

In a similar contest, over 35% of employees of the company, exclusive of those engaged in sales work, participated—614 out of 1,749. Here, also, multiple entries were permitted, raising the total entries to 908.

The contest was announced in the October number of the company's residential customer publication *Home Chats*, and promoted further in the November-December issue before the closing date of Dec. 2. Each family represented by one or more entries received a Monowatt Nite-Lite, a low-wattage plug-in lamp which helps prevent barking of shins against furniture in the dark.

Study Lamps to Weekly Winners

In each of the 9 weeks of the contest, certified study lamps with 50-100-150-w bulbs were awarded for the 7 best entries received. From the 63 winners thus accumulated, those to receive the grand prizes were chosen. Judges for the weekly prizes were company personnel, but those for the grand prizes were people not connected with the company. All awards were made on the basis of best and clearest statements of benefits obtained from using any style certified lamp. Entries consisted of completion in 25 words or less of the sentence beginning "I think I would benefit by using a certified lamp because . . . ."

There were 23 grand prizes, 3 firsts, 10 seconds and 10 thirds. Winners of firsts were given their choices of a refrigerator, a range, a food freezer, an automatic washer, a clothes dryer or an ironer. Those offered to second prize winners were an electric roaster and a mixer. Certified floor lamps were awarded to those who placed third.

28 Prizes to Employees

The employee's contest offered 28 prizes, one first, 2 seconds, 5 thirds and 20 fourths, but no weekly prizes. The first and second prizes were the same appliances as those offered to customers. The third and fourth prizes awarded employees were certified floor lamps and certified table lamps, respectively.

Customers and employees were asked to indicate their selections for first and second prizes when entries were submitted. Analysis of the first prize choices provided a useful disclosure of preferences among major appliances. According to this cross-section of people served by Monongahela Power, the refrigerator is still at the top of the list, with 25.5% of entrants preferring it. Next comes the home freezer, 19.8%. The range is a close third, with 19.3%. The automatic washer follows with 13.4% and the ironer is next with 9.7%. The clothes dryer is last, 3.2%. No preferences were indicated by 6.1% of the entrants.

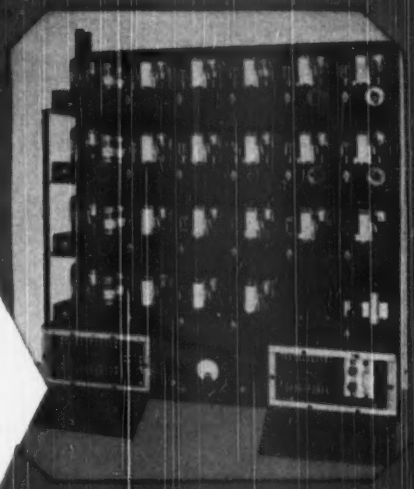
Remunerative Investment

Total cost of the contest was about $8,000. It is regarded as a productive investment in new business that will be more than off-set by added revenue from thousands of night lights, from appliance and lamp prizes, and from induced sales of lamps in company and dealer stores. Also, previous experience with such promotions and the results from them indicates that many more customers than actually entered the contest, perhaps half the total number of residential meters were caused to think at least a little about light, sight and certified lamps. No one can estimate the additional indirect boost that the company has gained as a result of these promotional activities, but one can be sure it is substantial.

NEW

DRIVER-HARRIS ELECTRONIC TESTING

Obsoletes Previous Methods of Testing Enameled Wire Insulation



This revolutionary Dielectric Continuity Tester at Driver-Harris checks the quality of coating on 10 strands of wire simultaneously—as the wire leaves enameling furnaces. Top switches on the test units are calibrated in impulses per minute required to operate an alarm. With the speed of the wire known, and also the maximum number of faults per 100 feet permitted by specification, each test unit is readily set to operate in conformance with the terms of the test imposed.

In order to guarantee the quality of a spool of enameled wire, *every inch* of the wire should be checked for dielectric faults, not just a few feet. In general practice, however, only a short sample of wire is examined. This is passed through a mercury cup held at a fixed potential, and shorts through the insulation are indicated on a voltmeter. If faults do not exceed a specified maximum for a given length of wire, insulation throughout the *entire* spool is assumed to be satisfactory.

This inefficient, compromise method has two important disadvantages: (1) the small portion of wire tested may not truly represent the condition of insulation throughout the spool; (2) insulation failures are not discovered until long after the enameling process is completed.

By checking insulation *continuously*, as wire leaves the enameling furnaces—the only 100% dependable way—Driver-Harris' new test equipment obsoletes such ineffectual and wasteful procedure.

So long as specifications are met, the new Driver-Harris electronic tester permits the enameling process to continue uninterrupted. When the *rate* at which faults occur approaches the maximum number of faults permitted by specifications, the test mechanism sounds an alarm and a record is made on a moving chart.

In this way, enamel coating is not only tested for continuity throughout the entire length of spooled wire, but sub-standard enameling is detected—and can be corrected—as soon as it occurs.

Thus makers of wire-wound resistors—particularly in finer sized wire, where shorts are more likely to occur—are enabled to eliminate time-waste and material-waste in their production, and obtain superior, more dependable products.

Makers of world-famous Nichrome and over 80 alloys for the electrical, electronic and heat-treating fields*

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco
Manufactured and sold in Canada by
The B. GREENING WIRE COMPANY, LTD., Hamilton, Ontario, Canada

FIFTIETH ANNIVERSARY — SPECIAL PURPOSE ALLOYS SINCE 1900 — D/H — TRADE MARK REG. U. S. PAT. OFF.

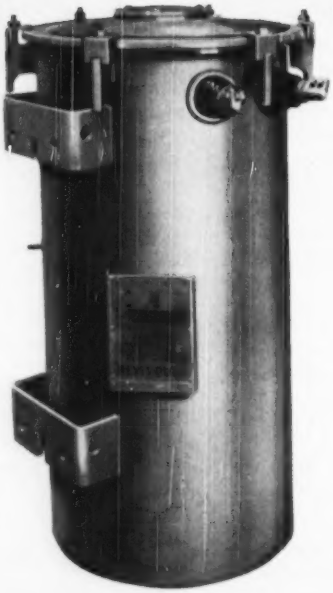
*T. M. Reg. U. S. Pat. Off.

Lamp manufacturers have spent years in research to provide good street lighting lamps that will give hundreds of hours of brilliant illumination.

Why spoil these good lamps with high inrush currents.

Hevi Duty Static Type Constant Current Regulators are designed to eliminate the conditions that shorten the useful life of a good lamp.

Write for bulletin CCR478



HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY

DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS

MILWAUKEE 1, WISCONSIN

INDUSTRIAL BRIEFS

Electric Brass Melting Furnaces are fastest and most economical; and the castings produced have the greatest uniformity in chemical composition, according to the Scoville Mfg Co, Waterbury, Conn. Two 1,000-kw furnaces have been installed and are in operation, and a third is being installed. Furnaces operate on 575 v, 60 c, 3 ph; each has max capacity 22,000 lb, and melting rate of 10,000 lb of brass per hr. Temperature control is automatic with permanently inserted thermocouple.

Capacitors Boost Feeder Capacity 31% at the Union Wire Rope Corp, Kansas City, Mo. More machinery had to be installed—but the company's transformers and feeders were fully loaded. By installing capacitors at or near each large motor, the magnetizing or kvar load was taken off the feeders enabling the company to install three new motors for every ten they had. This was accomplished without adding any additional copper or transformer capacity.

Infrared Lamps Dry Tenite in 25 to 30 min compared with two hours required by steam or electrically heated ovens, according to the Tennessee Eastman Corporation, Kingsport, Tenn. A satisfactory metal cabinet for drying Tenite contains a group of 250-w infrared lamps directed downward on a tray placed some 9 to 12 in. below. The lamps are placed as close together as practical and a sufficient number are used to cover the area of the tray completely.

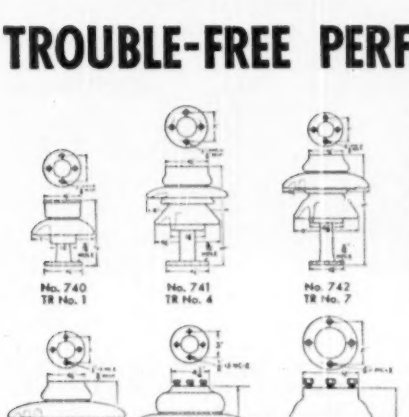
Better Lighting Improves Production at the Power Piping Division of Blaw-Knox Co, Pittsburgh, Pa., according to R. H. Harrod of the Duquesne Light Co. Workmen were formerly troubled with eyestrain and headaches from the harsh shadows and spotty illumination of the old lighting system. New system, consisting of 44-400-w mercury vapor lamps and 45-1000-w incandescent lamps alternated over the 30,000 sq ft of shop area, produces 20 ft-c of evenly distributed light, making seeing easier, eliminating headaches and improving employee morale.

ANOTHER VICTOR INSULATOR THAT SAVES AS IT SERVES

Left: VICTOR switch and bus insulators on a switching structure in the South.

Install VICTOR Switch and Bus Insulators and see how

TROUBLE-FREE PERFORMANCE REALLY PAYS OFF!



No. 740 TR No. 1 — No. 741 TR No. 4 — No. 742 TR No. 7

No. 744 TR No. 10 — No. 723 (2 unit stack) TR No. 16 — No. 729 (stacking unit) TR No. 140

THE number of service-years built into any switch and bus insulator can be determined *only by actual performance data*—data obtained from *all* types of station installations subject to *all* kinds of conditions. And, because of their rugged, heavy-duty construction, that is where VICTOR switch and bus insulators rate *high!* Facts prove VICTOR switch and bus insulators *retain* their original high standards even after many years of severe service. This means *fewer* replacements and *lower* maintenance costs. Find out how much trouble-free performance can *save* you—*standardize* on VICTOR switch and bus insulators.

Ready soon! *A new condensed VICTOR Catalog for handy reference. Write us now and reserve your copy.*

Get All the Facts! **CALL YOUR VICTOR REPRESENTATIVE**

J. A. Perkins Co., *Boston* • T. B. Dally, *Jersey City* • John J. Herrity, *Washington, D. C.* L. Morris Landers Co., *Atlanta, Charlotte* • Continental Sales & Engineering Co., *Pittsburgh* • H. J. Schwarzberg, *Cincinnati* • David D. Schneider, *Louisville* • Braisted & Bair, *Detroit* • Homer G. Hall, *Princeton, Ind.* • Guide & Dunlap, *Chicago* • Alton M. Johnson Co., *Minneapolis* • H. B. Koch, *St. Louis* • Fred B. Hearn, *St. Louis (Affton), Mo.* • Chas. L. Ward Co., *Kansas City, Mo.* Southwest Sales & Service Co., *Shreveport* • George E. Turbex, *Denver* • Myron Swendson, *Boise* Maydwell & Hartzell, *San Francisco, Los Angeles, Portland, Seattle.*

Also distributed nationally by Line Material Company

VICTOR
INSULATORS Inc.
VICTOR, NEW YORK

Look for this trade mark of enduring service

V

GENERAL ELECTRIC PROMOTION BUILDS

IT'S GENERAL ELECTRIC LAMPS' NEW "SPRING SHOWER

Here's the ad campaign that will bring a flood of sales!

Spring cleaning time is G-E Lamps Brighten-Up time—and we're filling empty sockets everywhere! This big advertising campaign includes full color ads April 2 in This Week; April 9 in Parade; April 10 in Life; April 22 in Post; April 24 in Life; May 14 in This Week; May 21 in Parade. Plus spot radio announcements and commercials on the Fred Waring television show!

4 OUT OF 5 PREFER G-E LAMPS*...

*In a recent nationwide survey made by the Psychological Corporation, 2500 persons were asked, "What brand of light bulb do you prefer to buy?" 4 out of 5 choosing a brand chose G.E.

"BRIGHTEN-UP TIME" LOAD FOR YOU!

OF G-E LAMP VALUES"... APRIL 3 TO MAY 20

Here is the display package that's helping dealers cash in!

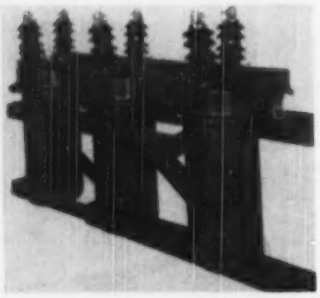
Bright, colorful counter cards! Window streamers and wall banners! Special display pieces! Everything lamp agents need to catch their share of Brighten-Up Time's rain of profits . . . and push residential lighting load to a new peak!

A NEW KIND OF G-E LAMP TO SPARK AGENTS' SALES! General Electric's new White lamp bulb gives softer shadows and less glare because it's "all-over bright". Now being featured in G-E Lamp advertising. Retails at 20c plus tax.

that's why they SELL ON SIGHT!

GENERAL ELECTRIC

NEW EQUIPMENT



Three-Phase Recloser

ADVANTAGES of Type FR-1 single-phase recloser are reported to have been extended to 3-ph operation by the Type FR-3 automatic recloser. Said to eliminate the hazard of burning out 3-ph loads by having only 1-ph lockout, the new units employ a common linkage to provide positive operation in locking out all three phases whenever a permanent fault occurs. When the fault is cleared, a single resetting operation may then reclose all three circuits. However, the three units operate as 1-ph reclosers whenever an intermittent fault occurs.

Primarily designed for rural distribution systems, the new unit has a short circuit interrupting capacity of 3,000 amp. Maximum service ratings are 100 amp, 15,000 v.

General Electric Co, Apparatus Dept, Schenectady 5, N. Y.

•

Land-Clearing Machine

IN ONE PASS over a densely wooded area, trees up to eight inches in diameter and all undergrowth are reportedly reduced to small fragments and deposited on the ground by the Bushwacker, "a mowing machine for trees." Regrowth is retarded because of fragmentation of trunk fibers at the root junctures. The machines can be used on power-line right of ways, building sites, and for "brushing".

Trees or bushes are reduced to small fragments through contact with twenty 19½-lb chrome manganese steel "flails" attached by chains to a revolving steel drum mounted at the front of the machine. The machine weighs 14 tons, mounted on a crawler-tractor unit and powered by a 168-hp diesel engine. It is 10 ft wide, 21½ ft long and clears a swath 6 ft wide at a speed of approximately 1½ mph.

American Steel Dredge Co, Inc, Fort Wayne 1, Ind.

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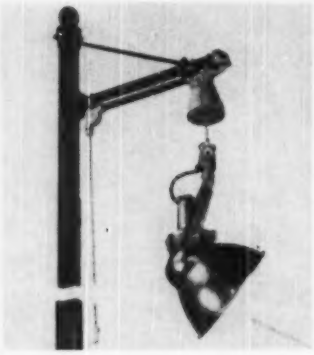
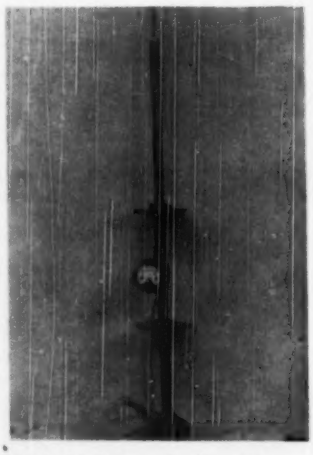


Outdoor Lighting Package

FOUR NEW ALL-ALUMINUM unit packages have been developed for outdoor lighting installations at switch yards, industrial plants, parking zones, loading docks, shipping platforms and airports. The packages contain a disconnecting and lowering hanger, lighting fixture adapter (for either pendant or yoke-type fixtures), a slip-fit elbow, bracket end, U-bolts, filler blocks, fixed position corner pulley, length of galvanized chain, and (optional) an open-type lock box or a fully enclosed, pulley-equipped lock box.

The entire operation of unlatching, disconnecting and lowering; raising, repositioning, reconnecting, and latching involves only a regulated pull and release on the chain or cable. Safe support of incandescent, fluorescent, or mercury-vapor fixtures weighing up to 120 lb is reported.

Thompson Electric Co, 1101-14 Power Ave, Cleveland 14, Ohio



High-Voltage Indicator

INSTANTANEOUS MEASUREMENT of voltage to ground up to 20 kv on live lines is stated to be possible with a portable electrostatic high-voltage indicator. Voltage to ground is measured with an accuracy of plus or minus 5%, making it possible to tell if a conductor has a voltage induced by proximity to live conductors and, hence, whether or not it would be safe to ground the conductor and allow work to proceed. There is no direct connection between the voltmeter and the line contact.

Two models in suitable carrying cases are available: Model 1 for systems up to 11 kv, and Model 2 for systems up to 33 kv.

Ferranti Electric, Inc, 30 Rockefeller Plaza, New York, N. Y.

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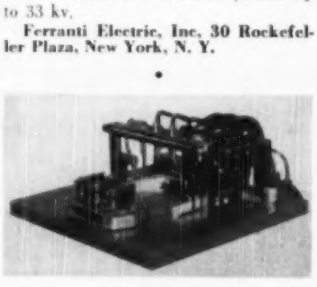
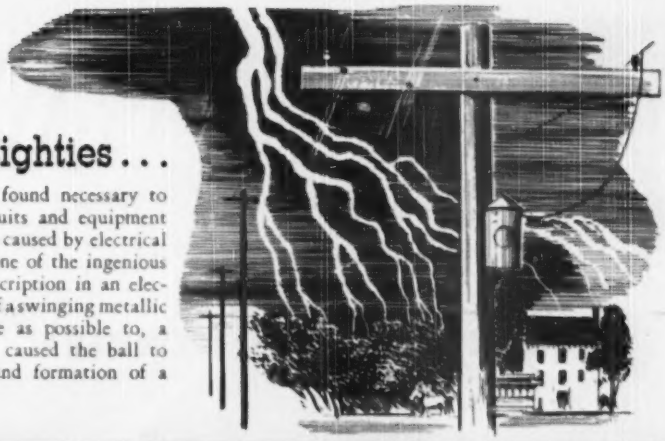


Instrument Cleaner

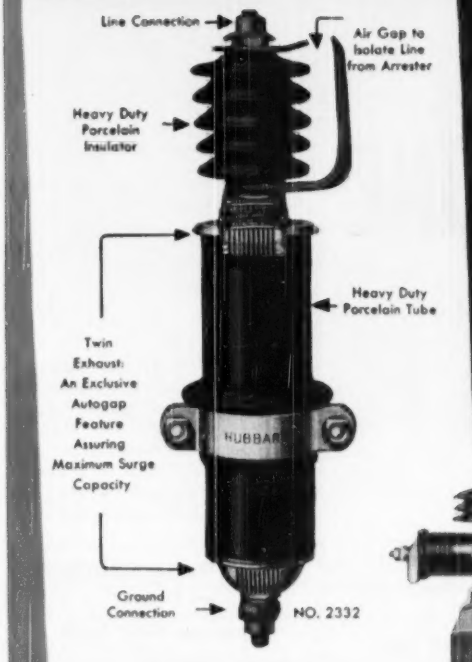
IN A MATTER of seconds after the part to be cleaned is inserted in the machine, the part is chemically cleaned by what the manufacturer calls the Eng-Sol Method, and then ejected to



In the Good Old Eighties . . .

Early in the electrical age it was found necessary to find some means of protecting circuits and equipment against the disturbances and damage caused by electrical storms. The "Razzle Dazzle" was one of the ingenious devices used. "It consists," the description in an electrical publication of that day says, "of a swinging metallic ball suspended above, and as close as possible to, a ground plate or table." Lightning caused the ball to swing, thus preventing a fusing and formation of a permanent ground.

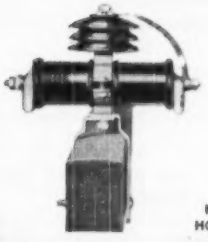
TODAY - The New HUBBARD VERTICAL AUTOGAP


Line Connection
Air Gap to Isolate Line from Arrester
Heavy Duty Porcelain Insulator
Heavy Duty Porcelain Tube
Twin Exhaust: An Exclusive Autogap Feature Assuring Maximum Surge Capacity
HUBBARD
Ground Connection
NO. 2332

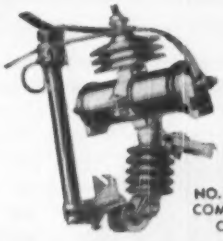
The new Hubbard Vertical Autogap possesses the same principles of design as the Hubbard Autogap Lightning Arrester for horizontal mounting, and offers an optional choice where a vertical mounting is desirable. All Hubbard Autogaps act on the expulsion principle. The follow arc is extinguished before it reaches the first current zero. A bracket is included, for mounting on pole, crossarm or transformer as desired.

Autogaps are also available in cutout combinations. Hundreds of thousands of Autogaps have proven their efficiency over an eleven year period, without a single failure resulting from operating conditions.

Write for complete details and specifications.



NO. 2302 HORIZONTAL STYLE



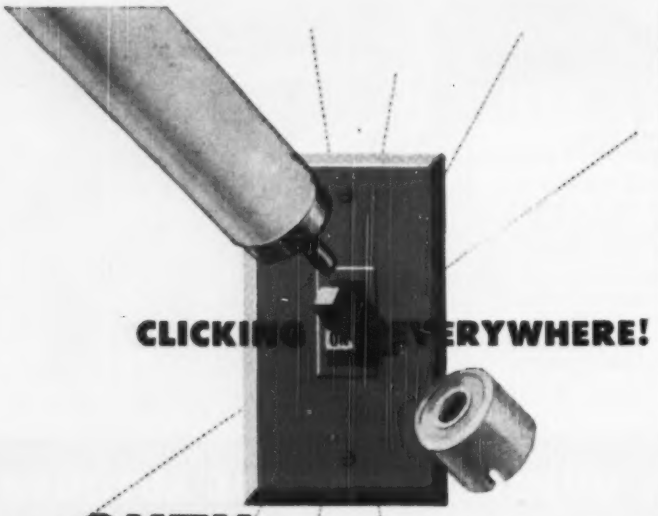
NO. 2315 COMBINATION CUTOUT

HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH CHICAGO OAKLAND, CALIF.

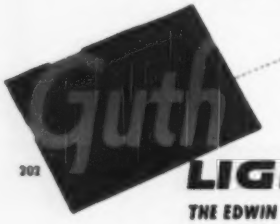


CLICKING EVERYWHERE!

GUTH 4 foot SLIMLINE

+light-at-the-click-of-the-switch!

+ No waiting
+ No starters or starter troubles
+ Lowest maintenance in fluorescent history
+ Easy-to-handle—one man can get it through a door
+ Available in every two and four 40W fluorescent fixture in the entire GUTH line!



202

FOR FULL DETAILS, CALL YOUR NEAREST GUTH RESIDENT ENGINEER OR WRITE:

LIGHTING

THE EDWIN F. GUTH COMPANY / ST. LOUIS 3, MISSOURI

Leaders in Lighting Since 1902

ready the equipment for the next part. Equipment involved in the method consists of (1) the cleaning unit itself (shown in illustration, cover removed) which is located above the work bench, (2) the operating solenoids and cover lift mechanism placed under the bench, and (3) a separately mounted control box.

Essentially, the method provides a high velocity spray of solvent and air which cleans the part. Precision instruments such as electrical contacts, gages, and regulators of 2, 4, 6, or more points, can be cleaned with the equipment. One quart of solution is said to clean 4,500 parts at a rate of 8.3 sec per part. Operation is from 115 v ac, 500 w max.

Passaic Analytical Laboratories, 224 Ayerigg Ave, Passaic, N. J.

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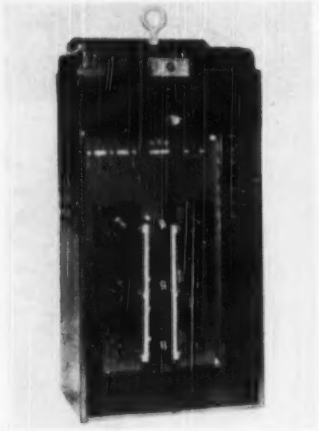


Rectifiers

THE NEW 2S SERIES of single and three-phase selenium rectifiers may be employed in power plants, mines, grain elevators, quarries, machine shops, printing houses, and in conjunction with a wide range of industrial equipment. The 2S rectifiers have a full wave bridge circuit, ebony panelboard,

MORE NEW EQUIPMENT

Just Received

Appearing Next Issue

GROUND DETECTOR
Grounds reportedly detected in minutes while lines are "hot"

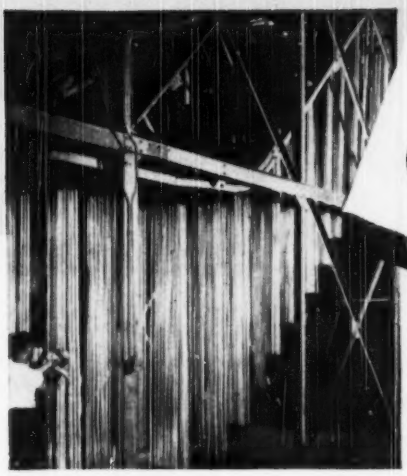
LIGHTNING PROTECTOR
For lightning, short circuit, overload rural protection

CARRIER EQUIPMENT
Single or multiple frequency operation for line loss to 55 db

OIL CIRCUIT RECLOSER
Larger bushings, 8-gal oil capacity for 25-kv rural circuits

Because IT MUST BE RIGHT

You can count on TRIANGLE HOT-DIP GALVANIZED STEEL CONDUIT



Lasting Protection — Smooth and uniformly hot-dip galvanized inside and outside, Triangle rigid steel conduit is dipped into special lacquer and baked in this endless conveyor equipment.

Your own experience tells you that conduit fails where the galvanizing is thinnest. That's why Triangle's *uniformity* is important to you. For the severest service, where a single pin-point of penetration could open the way to rapid rust and early failure, users upon users repeatedly specify Triangle conduit. That's why you see more and more "Tristeel" flexible steel conduit, more and more Triangle E.M.T. and rigid steel conduit being used throughout refineries, on bridges over salt water, in increasing numbers of industrial plants. Users' own impartial laboratory tests have repeatedly proved the superiority of Triangle—the conduit that's *uniformly* hot-dip galvanized . . . inside and outside . . . and then further protected by an exclusive new lacquer formulation!

Prove to yourself—in your own laboratory, or on your toughest jobs, that Triangle is the conduit you can count on!

The Trade Mark Of Top Value

TRIANGLE CONDUIT & CABLE CO., INC.

1900 JERSEY AVENUE • NEW BRUNSWICK, NEW JERSEY

IT *MUST* BE RIGHT!

Catalog No. 500 Gives Full Details Of the Complete Triangle Line

"Glazon" & "Triseal" Building Wire • "Tricon" Control Wire • "Adaptal" General Purpose Wire • "Trilex" Non-Metallic Sheathed Cable • "Trioprene" Trench Cable • Service Entrance, Parkway, Power & Varnished Cambric Cables • "Tristeel" Flexible, Thin Wall & Rigid Steel Conduit

Your Best Protection

FOR FLAMMABLE LIQUID AND ELECTRICAL FIRES

TRANSIL OIL
GASOLINE
SOLVENTS
PAINT, ETC.

GENERATORS
TRANSFORMERS
CIRCUIT BREAKERS
MOTORS, ETC.

ANSUL

DRY CHEMICAL

FIRE EXTINGUISHERS

They're most dependable too! Years of field service protecting all kinds of Electrical Equipment has resulted in outstanding design features available ONLY in Ansul Dry Chemical Extinguishers.

FIRE PROTECTION by the dry chemical method has proved *Most Effective* as well as *Most Economical*. And only Ansul offers a complete line of hand, wheeled and stationary dry chemical fire extinguishers. Investigate Ansul Piped Systems for protection of special hazards.

Send for File No. 509. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

ADVANTAGES

1. Quick, Positive Extinguishing Action.
2. Easier on the Spot Recharge (No special tools needed).
3. No Annual Recharge Necessary.
4. Low Maintenance Costs.
5. ANSUL PLUS-FIFTY Dry Chemical used Exclusively.
6. Long Range Stream.
7. Effective in Winds and Drafts.
8. Stream pattern forms heat shielding screen to protect operator.
9. Listed and Approved by Underwriters' Laboratories, Inc., and Factory Mutual Laboratories.

ANSUL CHEMICAL COMPANY

FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

DISTRIBUTORS IN PRINCIPAL CITIES IN THE UNITED STATES, CANADA AND OTHER COUNTRIES

and thermal protection. Lower capacity units are housed in 16-gage louvered wall mounting cabinets, and cubicles for rectifiers of greater capacity are the floor mounting type.

The six distinct series available include various combinations of normal convection cooling, fan cooling, autotransformers and double-wound transformers. Dc output voltages are 115 and 230 v, in capacities from 57 w to 80 kw. Dual ac inputs are 115/230 v or 230/460 v; single voltage ac inputs are 208, 230, or 460 v. Detailed information is in Bulletin 300.

Accurate Engineering Co, 2005 Blue Island Ave, Chicago 8, Ill.

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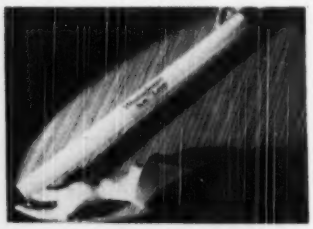


FLUORESCENT SUN LAMP—Output of the 4,000-hr lamp is concentrated in the mid-ultraviolet wave lengths (2,800-3,200A). It is available in 20- or 40-w sizes, identical in dimensions and electrical operating characteristics with standard fluorescent lamps.

Westinghouse Lamp Div, Sterilamp-Tenderay Dept, Bloomfield, N. J.

•

Polyethylene Insulation

MARKED ADVANTAGES where weatherproof or covered wire is desired are claimed for polyethylene-covered aluminum line wire. These advantages include smooth, clean non-sticky plastic material, black in color, and with high resistance to moisture, sunlight, weather and abrasion. Weight is reportedly one-half that of equivalent copper. Said to be free stripping, the insulation eases cleaning the wire for splices and taps; and there is no festooning.

Standard availabilities on this new line are: Solid aluminum wire in Awg sizes 6, 4, and 2; stranded aluminum conductor (7 strands) in Awg sizes 4, 2, 1 1/0, 2/0, 3/0 and 4/0; ACSR (6/1) in Awg sizes 6, 4, 2, 1 and 1/0.

Kaiser Aluminum & Chemical Sales, Inc, 1924 Broadway, Oakland 12, Calif.

•

Standby Generator

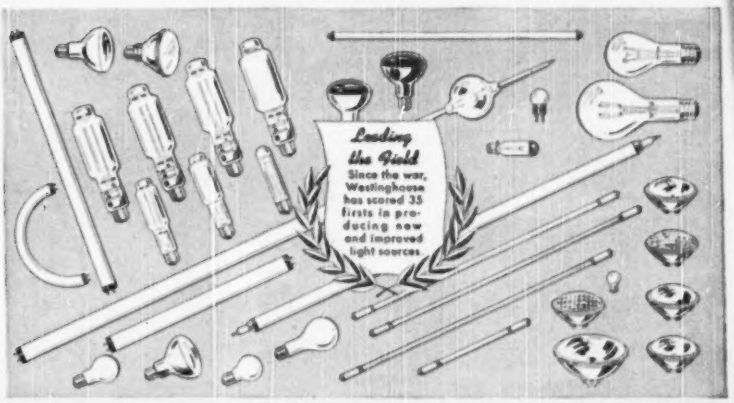
A STANDBY AC GENERATOR is being produced which, the manufacturer claims, takes over and furnishes 60-c, 115/230-v power just as if nothing had happened. An ordinary farm tractor

USERS SAVE 2/3

with
Westinghouse
Fluorescent Lamps

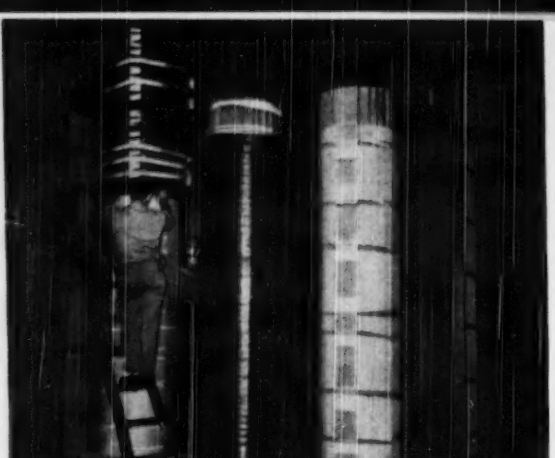
the lamps that last 3 times as long... yet cost no more!

Yes, one Westinghouse fluorescent lamp now lasts as long as 3. In average store installations, for example, it lasts 2½ years; in average one-shift offices or factories, 3 years. You actually buy lamps only ⅓ as often! You also save on *the time spent replacing burned-out lamps.* So, start getting these economies now. Next time specify Westinghouse fluorescent lamps. Lamp Division, Westinghouse Electric Corp., Bloomfield, N. J.



YOU CAN BE SURE... IF IT'S Westinghouse

1 PLANNING BEST WAY to expedite vital 20,000 kva power transformer from drawing board to installation, A-C engineers Maise, Ashbaugh and Cook review specifications.



2 20 TONS of high-grade electrical steel is built into core. Core is 5-legged double magnetic circuit design, to keep tank height low. Cap protects low voltage coil from abrasion as it is lowered on core leg.

20,000 KVA TAKES LOAD OFF SOUTHWEST'S SHOULDERS

3 TO WITHSTAND PRESSURE of tons of oil, tank seams will be tested at a vacuum of 28" mercury. Submerged arc welding process produces a controlled, continuous weld.

4 HUGE 400 TON HYDRAULIC PRESS assures a high degree of accuracy in fabricating bosses, frames, covers, etc. Press is also used to dome cover so that it will shed water.

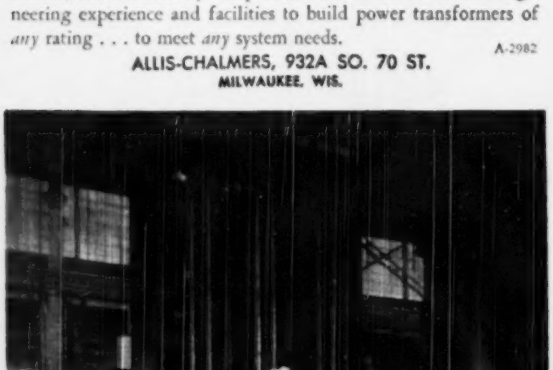
FROM AIR CONDITIONING SYSTEMS for skyscrapers to mile-deep oil wells, new commercial and industrial load requirements placed a heavy burden on the power distribution system of an expanding Southwest city.

Until . . . this 20,000 kva Allis-Chalmers power transformer was installed to serve the downtown network area, and several outlying substations.

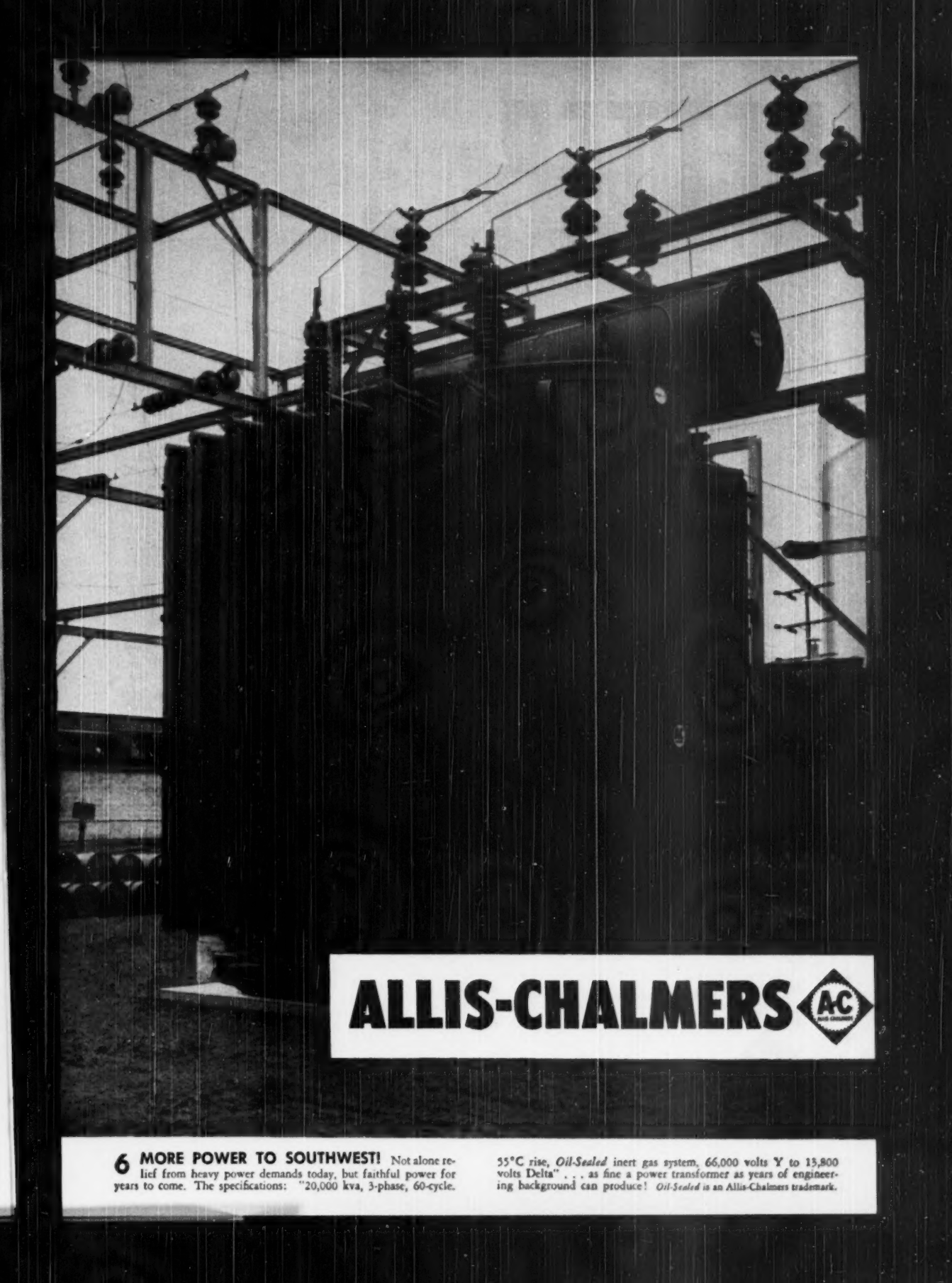
Whether 20,000 kva or the world's largest physical size transformer, such as recently completed, Allis-Chalmers has the engineering experience and facilities to build power transformers of *any* rating . . . to meet *any* system needs.

A-2982

ALLIS-CHALMERS, 932A SO. 70 ST.
MILWAUKEE, WIS.



5 DOWN SHE GOES for a preliminary fit. This permits faster tanking after dry-out to maintain high dielectric strength of insulation. Notched end plates guide and accurately position assembly.



6 MORE POWER TO SOUTHWEST! Not alone relief from heavy power demands today, but faithful power for years to come. The specifications: "20,000 kva, 3-phase, 60-cycle. 55°C rise, *Oil-Sealed* inert gas system, 66,000 volts Y to 13,800 volts Delta" . . . as fine a power transformer as years of engineering background can produce! *Oil-Sealed* is an Allis-Chalmers trademark.

BETTER...

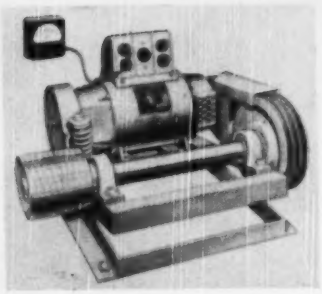
...any way you look at it!

CHANCE STEEL 8-Way Cone Anchor...

Linemen or *Groundmen* like the Chance Steel Cone because it is light weight—easy to handle and the nut retainer makes it easy to install. *Foremen* and *Construction Superintendents* like it because rough treatment and heavy tamping won't break it. They save on installation time and get a good solid job... Lighter weight, plus the fact that it stocks well makes the Steel Cone a favorite with *Storekeepers*. *Engineers* specify it because they can depend on steel and because the 8 flat wedging surfaces and the flaring base mean greater holding power. *Purchasing Agents* prefer it because they get all these advantages for *less* money—solid reasons for economy-minded *Management* men who demand lasting performance... Yes, *any way you look at it*, the Chance 8-Way Steel Cone is the *best* Cone Anchor buy on the market.

C554

ABC INDUSTRIES *You know it's RIGHT...*



will serve as drive for the generator. Power lines from the farm load are disconnected by a double-throw switch when the generator takes over.

Maximum output is given as 3,000 w at 100% power factor, 3,600 rpm, 50 C temperature rise. Drive belt pulley operates at 1,800 rpm, 4 or 5½ in. diam available. Connection box has lock type plug, and the portable voltmeter can be plugged in practically any receptacle.

Wincharger Corp, E. 7th & Division St, Sioux City, Ia.

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Megohm Meters

TWO NEW MEGOHM METERS, Models L-4A and L-6A, feature internal circuits said to assure the user that the applied voltage is the specified voltage as long as the resistance of the piece under test is within the range of the meter.

Model L-4A contains an internal 500-v measuring source as well as a 200-v source. The other model has a continuously variable measuring source ranging from 100 to 600 v dc. A voltmeter is provided for checking actual voltage being applied to test. With this model it is possible to test a piece for actual resistance changes as the voltage varies.

Industrial Instruments, Inc, 17 Pollock Ave, Jersey City 5, N. J.

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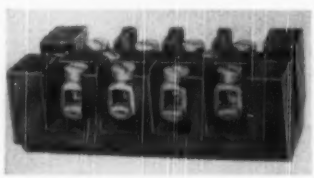

Terminal Blocks

SOLDERLESS TYPE molded terminal blocks reportedly eliminate the need for wrapping wires around studs or applying terminals to wire ends as with conventional screw type blocks. The terminal blocks are provided with compression type solderless units, each capable of receiving wires from No. 16 to No. 6 Awg.

Attachment of wires to the block is

accomplished by tightening screws after insertion of stripped wires. These blocks are rated at 35 amp, 600 v, and are available in 4, 8, and 12 circuit sizes. Screw-on covers are available.

Buchanan Electrical Products Corp, 1290 Central Ave, Hillside, N. J.

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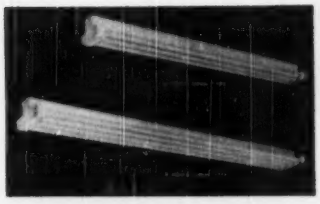

FIXTURES—Single-pin fluorescent slimline lamps, said to light up instantly without starters, are used in a new line of fixtures. They are in 4, 6, and 8-ft lengths, each available in 2, 3, or 5-lamp styles. Mounting can be flush or pendant, individually or in continuous rows.

Mitchell Manufacturing Co, 2525 Clybourn Ave, Chicago, Ill.

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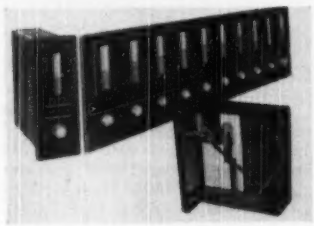

Level Indicator

CHANGES in liquid levels from any source are said to be visually reproduced on a graduated illuminated dial scale on the face of the Panellit level indicator. The gages are available in single units or any number of them may be grouped in multiples for flush panel mounting. Operation is from a 3 to 15 lb pneumatic transmitter or direct from valve loading pressure.

These gages may be provided with positive high and low level mercury alarm switches which are wired in series with a Panalarm signalling unit. This unit energizes a red signal lamp on the front of the instrument whenever the high or low settings are exceeded; a warning horn is also sounded.

Panalarm Products, 7218 N. Clark St, Chicago 26, Ill.

•

Step-Down Transformer

INTENDED TO SERVE as a step-down transformer for use in conjunction with portable extension lamps in hazardous locations, the Safety-Tran reduces 115 v to 6 v. It is said to be useful in damp and other conductive locations such as

from every angle

there's a good reason for choosing the

CHANCE STEEL 8-Way Expanding Anchor

Here's what the men who buy and use them say: *Linemen*—"We don't have so much weight to carry."—"It takes fewer licks to expand." *Foremen and Construction Superintendents*—"We do save some time and labor."—"There's no danger of breakage."—"We can tell when this anchor is expanded." *Storekeepers*—"They're easy to handle."—"Your colored identification tag is a big help." *Engineers*—"We can depend on the uniformity of steel."—"You've taken full advantage of all the area."—"Our tests show it has surprising strength."—"The cone shape is a good idea—you get a wedging action." *Purchasing Agents*—"Any time we can satisfy ourselves on quality at a price we like—we're happy." *Management*—"We've seen convincing proof that our lines are going to stay put with your 8-Way in the ground." You get more for your money in the Chance 8-Way Expanding Anchor.

C30-8

... when you specify CHANCE

excavations, chemical plants, and inside boilers and steel tanks. The transformer is furnished with a 6-ft, 2-conductor, rubber covered cord set for connection to standard 115-v outlets, and 18 in. of rubber covered supply cord which is spliced to a lamp cord extension. Insulation between primary and secondary windings is reportedly constructed to pass a 2,500-v test for one minute.

Super Electric Products Corp, 1057 Summit Ave, Jersey City 7, N. J.

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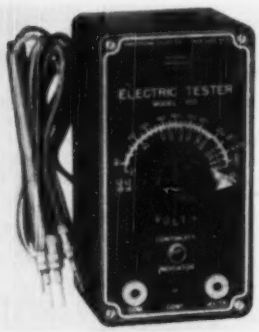


Circuit Tester

AN ELECTRIC TESTER, Model 100, was designed to test electrical circuits and appliances. It can be used for locating open circuits, shorts, and grounds; also, for testing ranges, shavers, irons, fans, refrigerators, and other appliances. Both ac and dc voltages between 70 and 660 v are measurable. Indication is given whether ac or dc, and whether the frequency is 25 or 60 c.

Amsterdam Sales Co, 98 Park Pl, New York 7, N. Y.

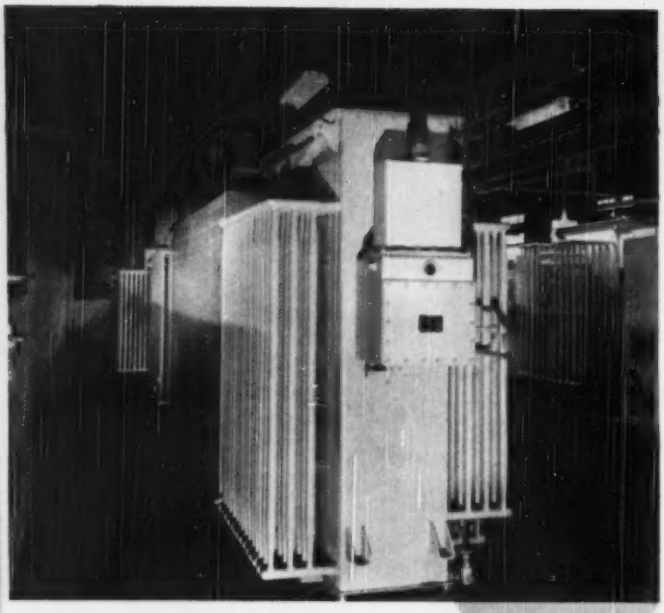
MORE NEW PRODUCTS
about which you should know

BENJAMIN REEL PRODUCTS, INC, 10700-10710 BROADWAY, CLEVELAND 5, OHIO, is making the Series 200 portable **grounding reels** for grounding static charges on fuel servicing equipment and for use at bulk stations, terminals, airports, airport hangars, and chemical plants. . . . MERTON INSTRUMENT CO, 432 LINCOLN ST, DENVER 9, COLO., has miniature **speed changers** available in more than 500 different ratios for instruments, controls, computors, and recorders.

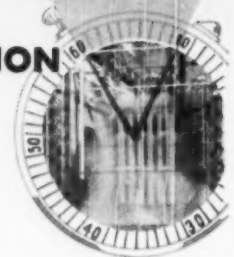
DISTILLATION PRODUCTS INDUSTRIES, RIDGE ROAD WEST, ROCHESTER 3, N. Y., is manufacturing an **ionization gage** control circuit capable of measuring

ON circuit breakers . . .
Motor controllers . . .
Transformer protective equipment
. . . Aviation relays . . . Contactors
. . . and similar equipment
Chances are . . .
STACKPOLE SILVER-TUNGSTEN CONTACTS
can save you money!
One of the most remarkable contact developments of recent years, Stackpole Silver-Tungsten Contacts have scored an outstanding performance record on a long list of difficult applications.
In particular, they are ideally suited for assuring low contact resistance under continued operations where heavy arcs are present or under closed conditions. Exceptionally high characteristics of strength, density and conductivity make this performance possible.
CONTACTS "TAILORED" to YOUR EQUIPMENT
Actually, there are only a few standard grades of Stackpole Silver-Tungsten Contact materials. The procedure in most cases is to adapt the percentages of materials in the contact mix to the contact operating requirements of a specific application. Preferably, this calls for laboratory testing of different contact compositions on the equipment under actual operating conditions—and this is a service Stackpole is glad to render for contact users. Send details of your equipment and its applications and we will gladly recommend either specific contacts or a laboratory test procedure that may result in a worthwhile saving. Stackpole contacts are sold only to makers of original equipment—not for replacement uses.
For a wealth of general contact information as well as specific data on Stackpole grades, write on company stationery for Stackpole Contact Catalog 12.
STACKPOLE CARBON CO., ST. MARYS, PA.
STACKPOLE
TYPICAL STACKPOLE SILVER-TUNGSTEN CONTACT MATERIALS
"Everything in Carbon but Diamonds"

Grade	Composition % Silver	Cross Breaking Strength Lbs. per Sq. In.	Hardness Rockwell Superficial	Density	Electrical Conductivity Ag=100	Contact Resistance Estimated Ag=100
FW56	70	57,000	15T75	12.0	75	120
FW49	50	82,000	30T56	13.2	55	150
FW41	35	108,000	30T77	14.6	45	200
FW34	32	110,000	30T70	14.7	40	250



HERE'S *positive*
TRANSFORMER PROTECTION
for you!



So sensitive to fire is *Automatic* FIRE-FOG, that a mere whisp of flame in this large transformer room is sufficient to bring action, immediate . . . decisive. This system of protection operates on the principle of quick response to heat and produces a fire quenching blanket of fine water spray. Actually, there is only a lapse of seconds between a blaze and its extinction. With FIRE-FOG nozzles strategically placed so as to cover every vulnerable area, positive protection is assured.

Automatic FIRE-FOG is specifically designed for your particular risk . . . electrically safe . . . approved by all leading insurance authorities. Cooperation between Your staff and *Automatic* FIRE-FOG engineers will enable us to solve your toughest fire hazard problems. Write for complete information . . . no obligation of course.

Automatic
FIRE-FOG
- IT BLANKETS - IT ISOLATES - IT QUENCHES -

. . . a famous member of the *"Automatic Sprinkler* Family . . . provides basic fire protection for process equipment and storage in the chemical and petroleum industries. On-the-spot protection for quench tanks, dryers, explosive hazards, conveyor openings, air filters, oil filled electrical equipment and other units vital to production line operations.

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO

"Automatic" Sprinkler
FIRST IN FIRE PROTECTION
DEVELOPMENT . ENGINEERING . MANUFACTURE . INSTALLATION
OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

vacua to 2×10^{-10} mm Hg. . . . EDWIN F. GUTH CO, 2615 WASHINGTON AVE, ST. LOUIS 3, MO., is offering a line of Alzak aluminum high bay **gym lights**, exposed and recessed types.

THE HELLER CO, 2153 SUPERIOR AVE, CLEVELAND 14, OHIO, is building **banding machines** for fastening outer coverings on cables and identifying the cable with bands in many sizes, metals, and colors. . . . HAMER DRIL CO, BOX 158 PLANETARIUM STA, NEW YORK 24, N. Y., has an **electric hammer** on which a small shock absorber is used to cut down vibration.

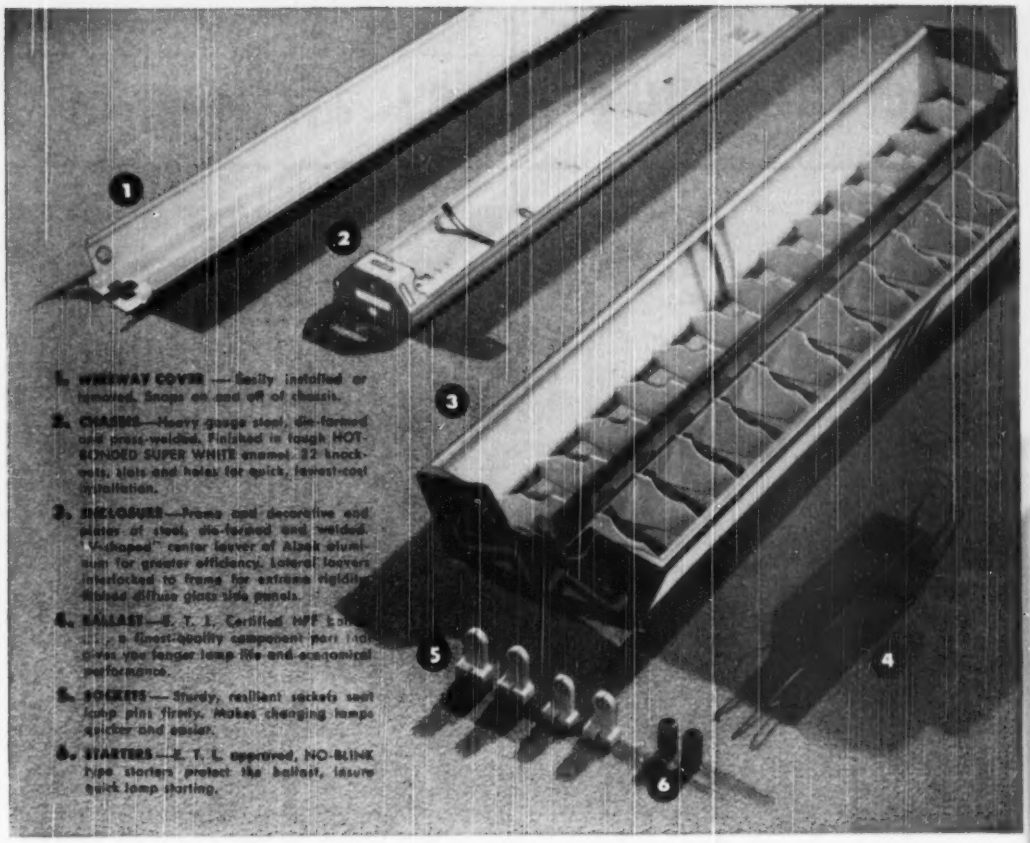
FAIRCHILD AIRCRAFT DIV, HAGERSTOWN, MD., has developed an automatic wire harness **test panel** for inspection of aircraft electric, radio, and electronic wire groups. . . . PRECISION RADIATION INSTRUMENTS, INC, 5478 WILSHIRE BLVD, LOS ANGELES 36, CALIF., offers a portable **Geiger counter** said to detect beta particles of energy as low as 160 k.e.v. as well as gamma, cosmic and x-rays.

ARK-LES SWITCH CORP, 51 WATER ST, WATERTOWN 72, MASS., has a spst **switch** rated at 1 amp, 125 v ac, to which electrical connection is reportedly made without tools. . . . DREMEL MFG CO, RACINE, WIS., is making an **electric eraser** for draftsmen and designers that also smoothes out the area for re-drawing; a rotating abrasive disc sharpens pencil or compass leads.

POTTER & BRUMFIELD, PRINCETON, IND., offers a redesigned series of LC plate circuit **relays** with breakdown insulation to 2,500 v rms and space on bobbin to allow for windings to 40,000 ohms. . . . HUNTER FAN AND VENTILATING CO, 400 S. FRONT ST, MEMPHIS TENN., has introduced an **attic fan** incorporating fan, motor and suction box in one unit in 4,750 cfm and 6,800 cfm capacities.

SYLVANIA ELECTRIC PRODUCTS, INC, 60 BOSTON ST, SALEM, MASS., has introduced a plastic-type **sealing cap** which fits over the ends of fluorescent sign tubing to permit color identification of the tube itself. . . . THE MILBURN CO, 3244 E. WOODBRIDGE, DETROIT 7, MICH., is making **protective clothing** with luminescent striping to reflect light of approaching vehicles or moving equipment; useful for utility employees doing emergency work at night.

WESTINGHOUSE ELECTRIC CO, P. O. BOX 2099, PITTSBURGH 30, PA., is marketing two and three-lamp industrial fluorescent **luminaires** with 2½ and 5-in. lamp spacing heavy-duty lampholders.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1. WIREWAY COVER — Easily installed or removed. Snaps on and off of chassis.
2. CHASSIS—Heavy gauge steel, die-formed and cross-welded. Finished in tough HOT-BONDED SUPER WHITE enamel. 22 knock-outs, slots and holes for quick, lowest-cost installation.
3. ENCLOSURE—Frame and decorative end plates of steel, die-formed and welded. "V-shaped" center louver of Alzak aluminum for greater efficiency. Lateral louvers interlocked to frame for extreme rigidity. Ribbed diffuse glass side panels.
4. BALLAST—G. T. L. Certified HPF Ballast, a finest-quality component part that gives you longer lamp life and economical performance.
5. SOCKETS — Sturdy, resilient sockets seat lamp pins firmly. Makes changing lamps quicker and easier.
6. STARTERS—G. T. L. approved, NO-BLINK type starters protect the ballast, insure quick lamp starting.

THE DAY-BRITE "VIZ-AID" PUTS ITS PARTS ON THE TABLE

Judge a book by its cover? Judge a lighting fixture by its appearance alone? No! Not if you want to be sure —*dead sure*— that the fixture you select will give you years of trouble-free, economical performance.

It's insides—*quality insides*—plus expert engineering, sturdy construction, durable finish and low-cost maintenance features that make the "Viz-Aid" such an outstanding value. Compare the "Viz-Aid" with any other fixture in your own "take-it-apart" test. Be sure! See for yourself how every inch of the "Viz-Aid" is quality built—*inside and outside*—to give you *real* economy through long, efficient service.

Day-Brite Lighting, Inc., 5425 Bulwer Ave., St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario. Distributed nationally by leading electrical wholesalers.

The Day-Brite "VIZ-AID"—available for two 40-watt lamps, two 85-watt lamps and four 40-watt lamps.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

ONLY QUALITY IS ECONOMICAL

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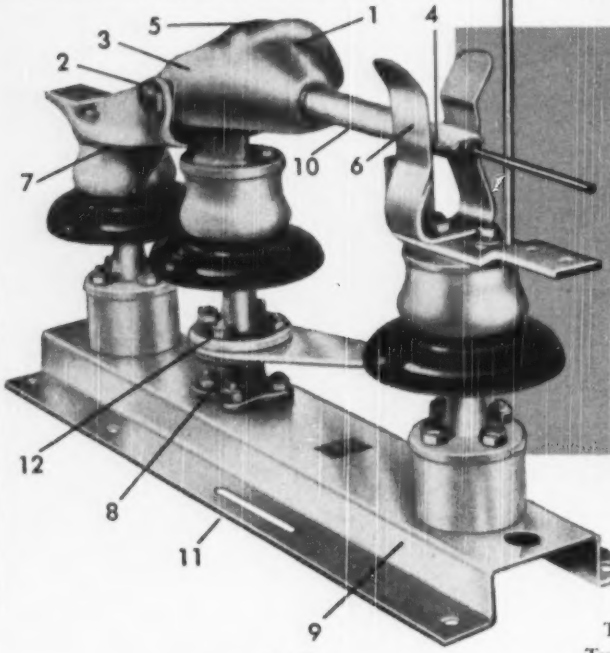
YOU CAN BE **SURE**.. IF IT'S

Westinghouse



1. Completely-enclosed hinge-end mechanism.
2. Live-side bearings, lubricated for life.
3. Completely-enclosed solid bridging contact at hinge end.
4. High-pressure line contacts.
5. Only three moving parts.
6. One-piece break jaw.
7. Simplified and enclosed counterbalancing spring.
8. Greaseless, reining insulator bearing.
9. High-strength, bent-plate steel base.
10. Single tube blade.
11. Flat mounting surface with no downward extensions.
12. Universal operating mechanism for group operation.

LOOK CLOSELY!

Do your disconnecting switches have these features?

Check the above features closely. Each one *alone* means a better switch for your money. Install the Westinghouse Type V and you get them *all*.

This combination of vital features makes the Type V the leader of the switch field in dependability, economy and low maintenance. Get the benefits of experience and top-grade switch design in *your* system. Install the Westinghouse Type V.

For complete information on the Type V, or on the entire Westinghouse switch family, get in touch with your nearby Westinghouse office or distributor. Ask for B-4241 and B-4242. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60699

Westinghouse

TYPE V

DISCONNECTING SWITCHES

NEWS ABOUT PEOPLE

Three New Vice-Presidents Elected by American Gas & Electric Service

American Gas & Electric Service Corp has elected three new vice-presidents, H. A. Kammer, V. M. Marquis, and F. G. Nagele.

Kammer, chief of the design and construction division since 1947, has been a director since 1948. He started with AG&E Service in 1924 as assistant design engineer working on high-tension substations and later became structural and construction engineer, design and construction engineer, and finally chief of the design and construction division.

Before joining AG&E he worked for Western Electric Co, American Machinery & Foundry Co, Ford Instrument Co, and New York Edison Co. He is a member of the general engineering committee of Edison Electric Institute and of several technical societies.

H. A. KAMMER

Marquis, who is system planning and operating engineer, spent 5½ years with an a-c design section and with the central-station engineering department of General Electric Co before joining AG&E in 1928. During the war he was lent to the power branch of the Office of Production Management, which later became the War Production Board. In Washington he was chief of the western regional unit of the power supply section in charge of power supply for 13 Western states and then chief of the power division.

V. M. MARQUIS

He spent about one year as assistant chief of the division of transmission and hydraulic engineering of Pacific Gas & Electric Co before returning to AG&E Service in 1946. Marquis has been a director of the company since 1948. He is a consultant to the National Security Resources Board's Office of Energy and Utilities and a member of the EEI electric power survey committee.

Nagele, purchasing agent for the service corporation and affiliated operating companies for the past eight years, started with AG&E Service Corp in 1911, only five years after its organization. Before World War I he was in charge of expediting material and supplies for the Windsor power plant and assisted the utility branch of the War Industries Board on priorities.

F. G. NAGELE

After his return from military service he entered the AG&E company's purchasing department as assistant to the purchasing agent.

•

Omaha PPS Appoints 3 Assistant Managers

Frank J. Moylan, Clarence W. Minard, and Glen A. Walker have been named assistant general managers of the Omaha Public Power District (formerly Nebraska Power Co). In making the appointments the board of directors abolished the posts of executive and operating managers.

Moylan, who has been operating manager, will continue in charge of operations. He started as an office boy and has been with the utility 39 years. He was made secretary-treasurer in 1931 and operating manager in 1948.

Minard, who was assistant chief engineer from 1924 to 1937, has been chief engineer of the private and then the public power organization since 1937. He will be in charge of power production, engineering, and distribution. Walker has been construction consultant for the past two years.

•

Thomas O. Moloney has been elected chairman of the board of Moloney Electric Co to succeed the late Thomas O. Moloney, Sr. **George J. Kribs** was elected treasurer of the company, succeeding the new chairman.

Austin D. Barney, president of Hartford (Conn.), Electric Light Co, has been elected chairman of the board of Connecticut Power Co, succeeding the late Samuel Ferguson. **Ernest R. Acker,** president of Central Hudson Gas & Electric Corp, Poughkeepsie, N. Y., has been elected to the CP directorate.

H. Richard Taylor, safety instructor in the Lancaster and Harrisburg divisions of Pennsylvania Power & Light Co, has been appointed safety engineer for the company. He succeeds the late P. L. G. Hasskarl. Taylor joined Edison Electric Co, predecessor to PP&L in Lancaster, in 1926 as a distribution engi-

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HIGH MECHANICAL STRENGTH

COMPLETE UNIFORMITY AND EXACT DIMENSIONS

These are the *plus* qualities you get with every piece of Equipment Porcelain made by Illinois! The whole process of manufacturing electrical porcelain is characterized by extreme care, not only in controlling the chemical composition of ingredients, but the particle size, moisture content, and the drying and firing temperature.

ILLINOIS
ELECTRIC PORCELAIN CO.

MACOMB, ILLINOIS

neer. He was transferred to the safety department there in 1931 and has been in first aid and safety training since then.

•

Pollard Named Manager of Puget Sound P&L Co

A. L. Pollard has been promoted from general superintendent of operations to operating manager of Puget

A. L. POLLARD

Sound Power & Light Co, Seattle. He succeeds Charles F. Terrell, vice-president and operating manager, who has resigned to become executive director of Nebraska Public Power System with headquarters in Columbus.

Pollard went to Seattle in 1930 from the Boston offices of Stone & Webster Corp, where he was a power engineer. He started with Puget Sound as superintendent of steam heat. Later he became assistant general superintendent of light and power as well, and in 1935 the functions were consolidated to make him general superintendent of light, power, and steam heat. He has been general superintendent of operations since 1945.

Pollard is a past president of the Electric Club of Washington and a member of the American Institute of Electrical Engineers and the Registered Mechanical and Electrical Engineers.

•

Herbert W. Eales has retired as consulting electrical engineer for Pioneer Service & Engineering Co after 22 years of service to the company and its predecessors. A native of England, Eales worked for General Electric Co and as chief electrical engineer of Union Electric Light & Power Co of St. Louis before joining the Byllesby organization in 1927 as chief electrical engineer in charge of the electrical division of the engineering department. In 1926 Eales assisted the Victoria, Australia, govern-

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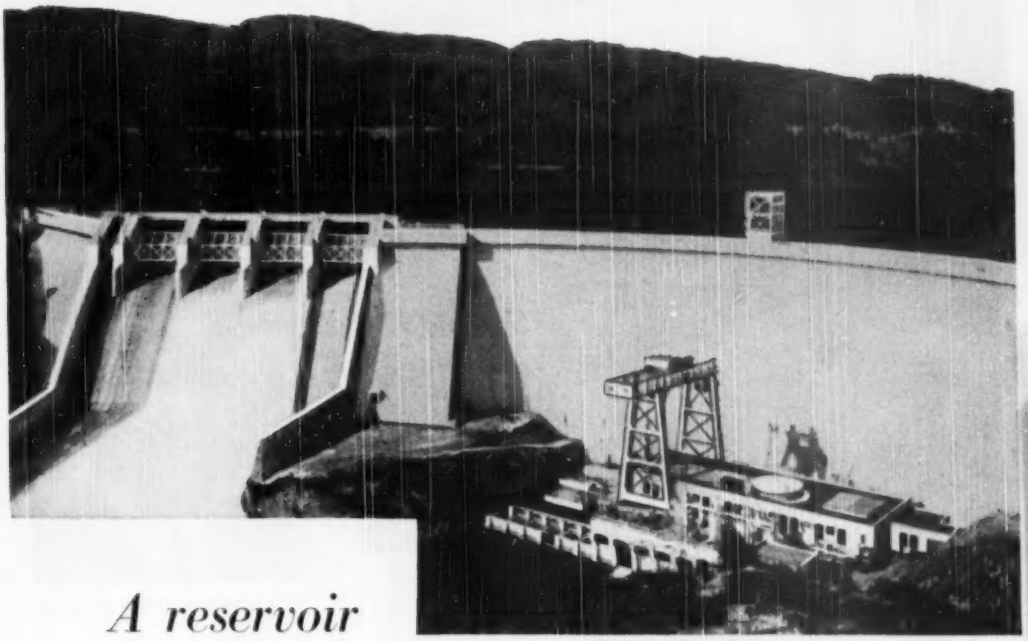

A reservoir of power for the PACIFIC NORTHWEST

This arch dam towering 315 feet above bedrock and the adjacent power station were engineered and constructed by EBASCO for the Pacific Power & Light Company.

Situated on the Lewis River, Ariel, Washington, the Merwin hydro-electric project has a generating capacity of 90,000 kw—providing a vital addition to the Northwest's huge power pool. Water used by one of the Merwin units, if operated full load for only 10 hours, would amount to about 1 billion gallons, or the present daily consumption of New York City.

A semi-outdoor installation—a type in which EBASCO has pioneered—Merwin embodies the latest in hydro-electric facilities. It is one of four hydro projects designed and built by EBASCO in the State of Washington.

You'll find EBASCO's engineering and technical skills the best solution of your design and construction problems—whether it's building a dam or expanding present plant facilities. To get the job done quickly and efficiently, call EBASCO.

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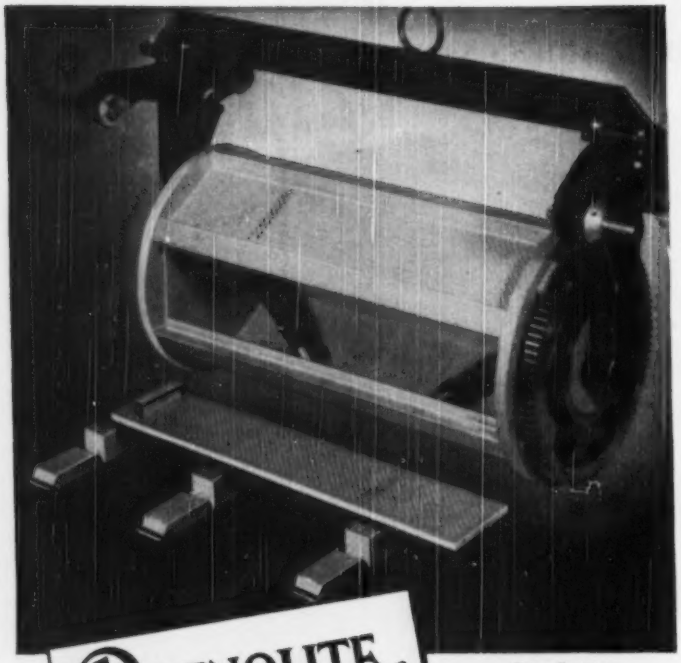

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Photo—Courtesy
The Udylite Corporation—Detroit

The ideal material for plating barrels where high resistance to corrosion is a "must."

In the electroplating of metals, plating barrels must have high resistance to corrosion from the strong chemical solutions for efficient low-cost operation. In this role, Melamine Fabric Base Phenolite has proved to be very effective because of its exceptional resistance to chemical corrosion.

Phenolite, in addition to these important qualities, is light in weight, with high impact strength, excellent electrical insulating properties and one of the strongest materials per unit weight known. Phenolite has broad use in most every industry because of its remarkable combination of properties. Available in a broad group of grades—in Sheets, Rods, Tubes and Special Shapes.

National Service Engineers will, without obligation, assist you in utilizing Phenolite, National Vulcanized Fibre and Peerless Insulation to your best advantage.

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ment in an investigation of the status and affairs of its State Electricity Commission. He is a fellow of the American Institute of Electrical Engineers and past vice-president of its seventh district and a past president of the Associated Engineering Societies of St. Louis.

•

Foster Wheeler Elects Admiral Mills President

Vice-Admiral Earle W. Mills, USN (Ret), has been elected president of Foster Wheeler Corp, New York, and

VICE-ADMIRAL EARLE W. MILLS

David McCulloch, vice-chairman of the board, has been made chairman of the board. Harry Sanford Brown, formerly chairman of the board and president, died Feb 18 while on a voyage to South America (EW, Mar 6, p 28).

Wartime deputy chief of the Bureau of Ships and chief of that bureau in 1946, Admiral Mills joined Foster Wheeler in 1949 as executive vice-president and director. He has been awarded an honorary doctor of engineering degree from the University of Louisville and the David W. Taylor Medal from the Society of Naval Architects and Marine Engineers for "notable achievement in marine engineering."

McCulloch joined Power Specialty Co, a Foster Wheeler Corp predecessor, in 1906. In 1927, when the present corporation was formed, he was made secretary. In 1935 he was named executive vice-president and in 1949 vice-chairman of the board.

•

Max A. Hinrichs, General Electric Co electrical engineer on marine and power installations on the Pacific Coast and in the Hawaiian Islands, has retired after 43 years with the company. Hinrichs enrolled in the student engineering course at Schenectady in 1907 and went to San Francisco four years later as field installation engineer of turbine

generators. In 1941 the company gave him its Coffin Award for the development of a new supporting and centering arrangement for turbine diaphragms. Recently he has been engaged in installation of hydro generators at Keswick Dam in northern California.

•

New Assignments

R. C. Fullerton, assistant treasurer of Florida Power & Light Co, has been named manager of the company's southern division. He will succeed **H. H. Hyman,** who is retiring. . . **Roger Bowen,** formerly with the U. S. Signal Corps, has been appointed head of the engineering department of Cannon Electric Development Co, Los Angeles. **D. Frank Jackson,** who has been acting chief engineer since the death of Edward Neifing, will continue in the department as chief assistant to Bowen. . . **Henry B. Ahlers** has been appointed assistant to John K. Hodnette, vice-president and general manager of Westinghouse Electric Corp's industrial products divisions. He will coordinate expense control programs for the divisions. . . General Electric Co has named **J. E. Ryan** and **C. P. Hayes** staff assistants to B. A. Case, manager of engineering of the small apparatus divisions. Ryan has been engineer in charge of the control division laboratory, and Hayes has been division engineer of the ballast division specialty transformer and ballast divisions. . . **Paul W. Hill,** formerly in the refrigeration division of General Electric Co, has joined the research and development department of Solar Electric Corp, Warren Pa.

OBITUARY

Barclay J. Sickler

Barclay J. Sickler, 44, assistant power manager of Bonneville Power Administration, and former chief of the power division of the Office of War Utilities, died March 14 at Vancouver, Wash.

Sickler joined the power branch of the Office of Production Management in 1941 to organize its research and statistics branch and helped formulate the energy-use curtailment program for the Southeast. After a brief return to BPA, where he headed the rates and statistics section, he became chief of priorities for the War Production Board.

In August, 1942, he was made deputy director of the power division, and the following year when OWU was organized he became director of its power division. In December, 1944 he resigned to return to Bonneville as chief of its division of power sales and service.

Sickler's early career included work with the Institute for Economic Re-

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- **FAST, EASY INSTALLATION**
- **ECONOMICAL COSTS**
- **DEPENDABLE STRENGTH**
- **LASTING HOLDING POWER**

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ALBION-DILLON
Malleable Iron ANCHORS

Albion-Dillon Anchors have outstanding features in design, construction, installation and use. Three long, reinforced blades are forced and locked into solid earth to assure maximum holding power. And A-D Anchors are made of *Malleable Iron* for greatest *lasting* strength.

They are quickly and economically installed under practically all earth conditions. Three sizes—3", 4" and 6", with two variations of blade spread in the 6" size—are available.

If you're specifying the same old anchors through habit, or if you need anchors for the first time, be sure to learn about the unusually fine A-D Malleable Iron Anchors before your next order. Readily approved by the R.E.A. and used by many leading companies, A-D Anchors are receiving wide acclaim.

Investigate the facts and features of A-D Anchors, and you'll be convinced they are *the* Anchors to specify today!

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CAN MEAN THE DIFFERENCE
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YOU know the difference in time and efficiency good equipment makes. It's just one more reason why so many utility companies rely on Bartlett. More equipment and better equipment . . . up-to-date and maintained in top condition. This assures speed and clean work that reflects to your credit. The name Bartlett means the best in tree work . . . and your customers know it.
YOU receive plus value when you retain Bartlett. Play safe; your name and prestige is at stake, too. Call our local office in your community or write direct for our nearest representative to call.
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search of Northwestern University and as a statistician for United Public Service Co, Chicago. He left the public accounting firm of Frazer and Torbet, Chicago, to become a statistician for the Wisconsin Public Service Commission. He joined BPA in 1939.

•

Jacob T. Barron

Jacob T. Barron, 65, vice-president and a director of Public Service Electric & Gas Co, Newark, N. J., died

JACOB T. BARRON

March 12 in Elizabeth after a month's illness. He had been with the company since 1907.

Before joining Public Service Barron worked for General Electric Co in its testing department at Schenectady, N. Y. Among positions he had held with Public Service were chief operator of substations, superintendent of the central division, general superintendent of production, and general manager of the electric department.

Barron was named vice-president in charge of electric operation and a director in 1935. In January, 1948, he took over combined operations.

A director of Edison Electric Institute and active on its Codes, Standards, and Budget Committees, Barron also had been a director of American Standards Association.

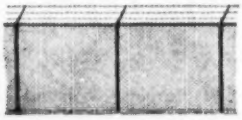
•

George H. Hoyles, of the consulting engineering division staff of the Ontario Hydro-Electric Commission, died March 12 in Montreal.

Arthur S. Longley, for many years treasurer of the then Worcester (Mass.) Electric Light Co, died at Worcester March 13.

Samuel P. Moffit, 53, executive vice-president of the Ruberoid Co since 1945, died March 14 in New York City after a long illness.

Stewart Iron Picket and Chain Link Wire Fences are being used by public utilities everywhere for the protection of equipment erected outdoors. Both types of fence offer many exclusive structural advantages you can't afford to overlook. Write for catalogue.



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Fit any height or width. Easily and quickly erected. When writing for prices please give all measurements involved.

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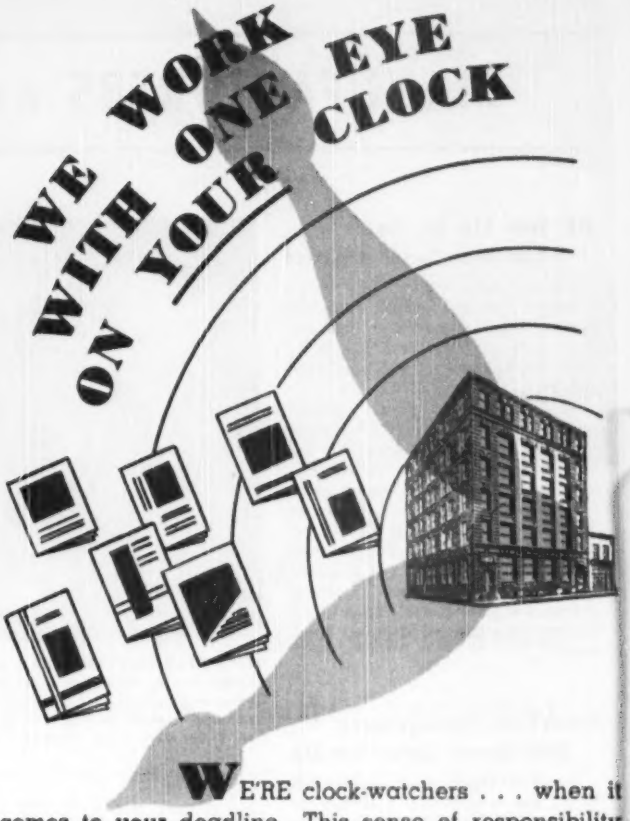

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MANUFACTURERS and MARKETS

GE Sets Up St. Louis Apparatus Sales District

General Electric Co's apparatus department has established a new sales district, with headquarters at St. Louis. It includes all sales areas now in the St. Louis, Kansas City, and Omaha territories.

G. F. Maughmer, former manager of the GE sales office at Los Angeles, has been appointed to head the new district. With GE since 1923, he also has been manager of the Phoenix office. He received a Charles A. Coffin award from the company for his work as coordinator of General Electric activities on the construction of the Colorado River Aqueduct. Maughmer is a former chairman of the Arizona section of the American Institute of Electrical Engineers.

•

AmerTran Inaugurates Distributor Sales Set-Up

American Transformer Co, Newark, N. J., has inaugurated a distributor sales program, with Charles L. Davis as manager.

Under the new plan it is expected that eventually all sales of standard equipment to contractors, industrial plants, and jobbers will be made through distributors. Appointed in key locations throughout the country, the distributors will carry stocks of the most frequently used ratings of AmerTran transformers and allied electric equipment for industrial, laboratory, and electronic applications.

Davis was vice-president in charge of sales, service, and advertising for Jones Motorola Co, Stamford, Conn., manufacturer of tools and equipment, from 1944 to 1949. Earlier he served as assistant to the vice-president of the Central National Bank of New Rochelle, N. Y., and assistant to the treasurer of the Delaware, Lackawanna & Western Coal Co, New York, N. Y.

•

Christoffel Sentenced

Harold Christoffel has been sentenced by a federal district court in Washington to serve two to six years in prison for perjury. The former president of Local 248 of the CIO United Automobile Workers at Allis-Chalmers Manufacturing Co was convicted on five counts. An appeal is expected. The sentence was the same as that given him in 1948 when he was convicted on the same charges. The earlier conviction was thrown out by the United States Supreme Court on a technicality.

DELTA STAR ELECTRIC CO has been awarded bronze plaque by Goodwill Industries of Chicago, Inc, as industry that has done most for handicapped in Chicago area. Above, C. Murray Campbell, Goodwill Industries vice-president, makes presentation to A. S. Pearl, Delta Star co-owner, as, l to r, J. G. Moore, Sears Roebuck & Co; E. B. Elmore, Marshall Field & Co; Mary Louise Freeburger, Mandel Brothers; and S. L. Hypes, Wieboldt's, watch

MANUFACTURING BRIEFS

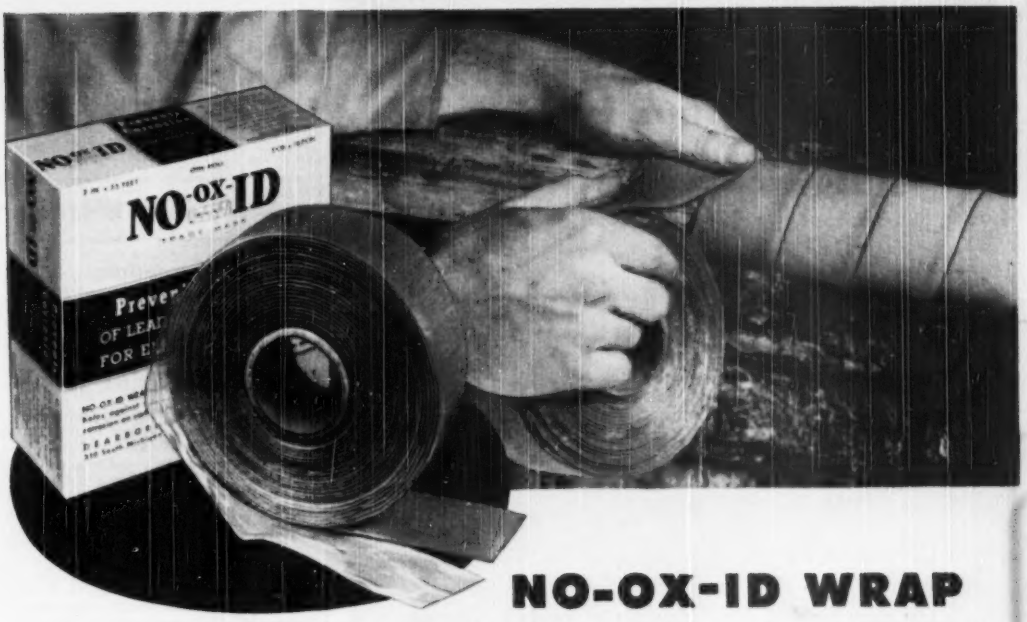
Fr. Sauter, S. A., electrical apparatus manufacturer of Basle, Switzerland, has appointed Brown Boveri Corp as distributor for its products in the United States.

General Motors Corp has signed an interim bargaining agreement with the International Union of Electrical Workers—CIO following the National Labor Relations Board election that gave IUE bargaining rights for General Motors' five electrical plants. The agreement merely transfers to IUE the previous United Electrical Workers contract, which runs to April 28. A new contract will be negotiated with IUE.

Production of primary aluminum rose more than 25% in January. That month's output totaled 104,045,600 lb, compared to 82,322,329 lb in December. Orders being received indicate it will be produced at capacity at least during the first half of 1950, according to the Aluminum Association. Shipments of aluminum sheet, strip, and plate also moved up in January to 69,349,363 lb from 62,524,984 lb in December.

Westinghouse Electric Corp's equity plan for financing purchases of Westinghouse products through local banks is being broadened to include distributor and dealer inventory and display stocks of air conditioning equipment and the Home Precipitron, an electronic air cleaner. Under the plan, introduced in 1948, Westinghouse agrees to repurchase any repossessed merchandise whose purchase was financed through local banks.

Electrocoils, Inc. newly organized coil winding firm with factory and sales office in Trenton, N. J., has begun manufacturing operations. The new company is successor to the coil winding division of John A. Roebling's Sons Co, Tren-



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SAVES TIME • SAVES LABOR • MORE EFFECTIVE

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NO-OX-ID Wrap, in the convenient roll form was designed for and approved by the electrical industry. With NO-OX-ID Wrap, you get better control of coating operations, smoother coverage and you eliminate the possibility of voids.

Check These Advantages:

- **Waterproofing and corrosion resistance in one easy operation**
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- **Easy and clean to work with**
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- **Convenient size for stocking and handling**

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More and more companies are using Pinco L 1510's for dead-ending on their distribution lines because of their unusual strength-for-size characteristics. Incorporating design features which have enabled them to roll up millions of service years without replacements for electrical or mechanical failure, these rugged L 1510's have proved conclusively that maintenance costs *stay down* when Pinco goes up! So specify Pinco and Pinco performance will prove the wisdom of your choice.

See page 64, Pinco Catalog No. 49 for complete electrical and mechanical characteristics.

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• 1920 Thirty Years Service to the Electrical Industry 1950 •

ton, whose entire production equipment it recently purchased. John J. Bednar and John E. Nolan, both formerly with the Roebling division, are president-treasurer and sales manager, respectively, of Electrocoils.

SALES ASSIGNMENTS

COMPANY STAFFS

Westinghouse Electric Corp, Pittsburgh, has appointed Russell L. Saling maintenance sales supervisor for the Pacific Coast district, with headquarters at San Francisco. He has been a Westinghouse maintenance salesman at Portland since 1944.

Allis-Chalmers Manufacturing Co, Milwaukee, has named six new representatives to offices in the general machinery division's Midwest and Central regions. They are Francis D. McGuire, Jr. and Donald E. Shaw, Chicago; Richard W. Shuman, Indianapolis; John W. Matthews, Louisville; Robert G. Naethans, Cleveland; and James A. Sudduth, Toledo.

Wagner Electric Corp, St. Louis, has added two division sales offices. N. G. Alvis is in charge of the New Orleans office, a sub-branch of St. Louis sales, at 227 International Trade Mart. The Davenport, Iowa, office, located in the Kahl Building, is under the direction of S. R. Snyder and is a sub-branch of Chicago.

Babcock & Wilcox Tube Co, Beaver Falls, Pa., has appointed H. F. Lefferty to succeed H. P. Curtis as Pacific Coast sales manager. Lefferty, most recently Chicago district sales manager, has been with the company 33 years. His headquarters will be in the Petroleum Building, 714 Olympic Blvd, Los Angeles.

U. S. Expansion Bolt Co, York, Pa., has appointed E. C. Belcher tri-state district sales manager in Ohio, Indiana, and Michigan. His headquarters will be at 224 Defiance Ave, Findlay, Ohio.

Apex Electrical Manufacturing Co has appointed Stephen A. Ceruti as assistant western division sales manager. Ceruti, who has been office manager of the San Francisco branch office since 1947, will assist L. D. Stull, western division manager.

Line Material Co, Milwaukee, has appointed Carl J. Morton resident field engineer in Alaska, with omce in Anchorage. He formerly was with Anchorage Municipal Utilities. Morton also will be in charge of a new warehouse being opened in Anchorage with a complete stock of L-M equipment.

Diehl Manufacturing Co, Somerville, N. J., has named James E. Ryan manager of a new district office and warehouse in the Singer Building, 5900 Second Boulevard, Detroit 2, Mich.

REPRESENTATIVES

Automatic Transportation Co, Chicago, has appointed two new distributors. Nook & O'Neill, Inc, 10028 Carnegie Ave, Cleveland, will serve northwestern Ohio, and Nelson Equipment Distributors, 913 Roosevelt Building, Indianapolis, will serve Indiana except for the South Bend area and those counties near Louisville, Ky.

Rural Electrification Engineering

1. This new book covers the fundamental design features of rural distribution lines; the basic factors underlying the application of electricity to heat, light and power; and the administrative problems underlying a sound, progressive rural electrification program. **By U. F. Karg, Assoc. Agr. Eng., Va. Agr. Experiment Station. 343 pages, $3.50.**

Electric Power Industry

2. Electrical World's valuable survey of the development and potential of modern electric systems, covering energy generation, distribution and utilization. Brings you in compact form the unique record of the development of hydro- and turbo-electric power plants—of techniques for the construction operation and maintenance of the far-flung systems—of public regulation over companies—of the rise of industry organizations. Outstanding specialists contributed their knowledge to make this volume a unique log of industry achievement. **Compiled by the editors of Electrical World. $3.50.**

Electrical Estimating

3. All the information you need to estimate the cost of any electrical construction job . . . quickly and accurately. Covers everything from the selection and training of estimators, and the proper use of estimating tools . . . to the cost of preliminary estimates, and the preparation of final bid sheets. Contains scores of sample estimates of actual construction costs. **By H. Ashley, Research Eng'r. 307 pages, $6.50.**

Electrical Machinery

4. New Third Edition packed with up-to-date help explaining the installation, operation and maintenance of electrical machinery. Goes from the fundamentals of magnetism, electromagnets and electrical circuits . . . to the latest available data on electron tubes and circuits in which they are used. Includes material on how electrical instruments are built, motors and measurement techniques, a-c and d-c motors, etc. **By F. A. Annett, Power. 484 pages, $3.75.**

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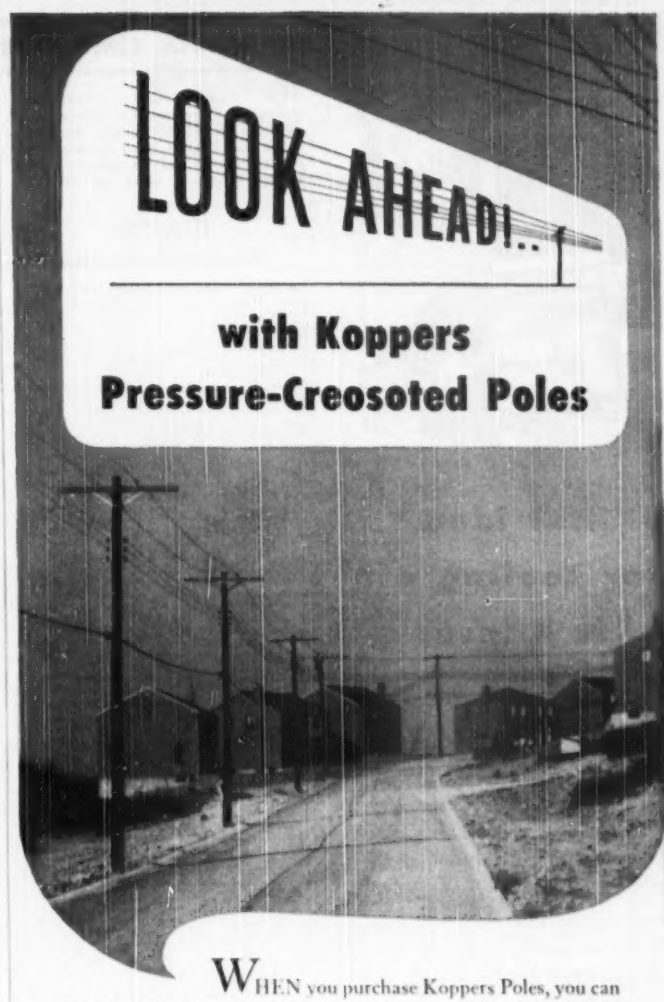

WHEN you purchase Koppers Poles, you can look ahead to *longer* pole life . . . to *longer* periods of continuous company service . . . to *lower* annual operating costs.

Koppers Poles are pressure-creosoted against decay for their full length. Because of highest standards of treatment, longest life is assured. Because they *retain* their strength, fewer poles go out of service, even under the most severe climatic conditions.

Be sure to specify Koppers Full-Length Pressure-Creosoted Poles. Then *you* will be all set to look ahead to the best pole service it is possible to purchase.

KOPPERS COMPANY, INC., **Pittsburgh 19, Pa.**

KOPPERS

Deliveries of Koppers Pressure-Creosoted Poles are made promptly from many conveniently-located treating plants.

PRESSURE-CREOSOTED WOOD

Hot idea for cooling off in Kansas

KANSAS summers are *hot*, as any Jayhawker knows; but one farmer figured a way to beat the heat! By pumping icy well water into an old auto radiator and blowing air through it into his home, he found relief in a hurry! Another ingenious use for the greatest rural servant . . . electricity!

Wherever electricity spreads, you will find Hemingray Insulators, dependable always for efficient pole-line insulation.

No. 670 for 12,000-volt lines. The Technical Standards Committee of the Rural Electrification Administration has approved Hemingray Insulators No. 670, No. 680, and No. 514, under the limits of AIEE Specification No. 41-1944 for use on REA lines.

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American Structural Products Company
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NEW ELECTRICAL CONSTRUCTION

NEW ELECTRICAL construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included

UTILITIES

Proposed Construction

Arizona—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Yuma, Ariz., power distribution boards, distr. panel board, battery charges, etc. for Pumping Plants 1, 2 and 3, Gila Proj., Spec. 2944. L. N. McClellan, ch. engr.

Arizona and Nevada—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., control switchboard, motor-generator sets, switchboard cubicle, cabinets for Coolidge and Mesa substation, Davis Dam Proj., Spec. 2942. L. N. McClellan, ch. engr.

Colorado—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Brush, transformers for Beaver Creek substation Colorado-Big Thompson Proj., Spec. 2941. L. N. McClellan, ch. engr.

Ill., St. Charles—State of Illinois, Springfield, general work, machinery and equip., power piping, heating, plumbing, insulating and electrical work for rehabilitation power plant at Illinois State Training School for Boys. $250,000.

Ind., Kendallville — City, municipal power plant imprv. incl. 6,000 kv. turbogenerator; remodel electrical distr. sys. $500,000. Boyd E. Phelps, engr.

Minnesota—Dairyland Electric Co-operative Assn., Grand Rapids, furnish labor and materials, except conductor and construct approx. 92 mi. rural distr. lines, and approx. 8.3 mi. 22 kv. transmission lines, Itasca, St. Louis and Aitkin Counties. $160,000. Plans deposit $10. C. J. Hastad, Halstad, engr.

Minn., Luverne—City, H. Moeller, recdr., Luverne, municipal power plant imprvs., furnish, erect complete steam generating unit, 45,000 lb. per hr., on owners fdn.; furnish, deliver 3,000 kw. turbine generating unit, a 4,500 sq. ft. surface condenser, 2,500 g.p.m. circulating water pump and auxiliary equip. Approx. $68,000 each. Plans deposit $35. Pfeifer & Schultz, 702 Wesley Temple Bldg., Minneapolis, engrs.

Missouri—Citizens Electric Corp., Theo A. Carron, pres., Ste. Genevieve, labor only, about 186.67 mi. rural distr. lines, Sect. D; 117.28 mi. Sect. F and 187.92 mi. Sect. S; total 491.27 mi. 7.2 kv. single-phase rural distr. lines, Ste. Genevieve, Perry and Cape Girardeau Counties, Missouri 58D, 58F and 58G. Bids 2/2, rejected. Drazen & Assoc., 8135 Forsyth Blvd., St. Louis, Zone 24, engrs.

Missouri—Three Rivers Electric Co-operative, Linn, 300 mi. rural distr. line and sys. imprvs., Osage Co. $700,000.

Nebraska—Cherry-Todd Electric Co-operative, Valentine, 260 mi. rural distr. lines, Cherry Co. $300,000. D. O. Flahart, Rapid City, S. D., consult. engr.

Nebraska—Seward County Rural Public Power Dist., Seward, 110 mi. rural distr. lines, Seward, Lancaster, Butler and York Counties. $125,000. Henningson Eng. Co., Standard Oil Bldg., Omaha, consult. engr.

N. C., Fort Bragg—U. S. Eng., 308 Customhouse, Wilmington, underground conduit, pull boxes, manholes, installing telephone cables, Serial No. Eng-31-075-5o-3.

S. D., Estelline—City, power plant addn., generating equip., switchboard, $75,000. Kammerman & Flahart, Rapid City, engrs.

Tex., Brownsville—City, 66 kv. power line, Brownsville to Port Brownsville, $60,000. H. L. Stokeley, City Hall, city engr.

Wyoming—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Thermopolis, Wyo., control board, battery charger for Thermopolis substation, Transmission Div., Missouri River Basin Proj., Spec. 2943. L. N. McClellan, ch. engr.

Correctly Shaped for MAXIMUM Holding Power
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EXPANSION ANCHORS

- Materials are resistant to banding and corrosion.
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Low Bidders & Contracts Awarded

Idaho, Moscow—University of Idaho, Moscow, electrical switching station for new campus bldgs., to Moscow Electric Co., Moscow. **$91,135.**

Minn., Elbow Lake—Village, A. W. Roettiger, clk., municipal diesel electric generating and distr. plant, to Morse & Co., 220 E. 5 St., St. Paul, **$145,735.** Bids 3/1.

Montana—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., Schedule 1, one 208 kva step-voltage regulator for Havre substation Fort Peck Proj., Spec. 2980, from Pennsylvania Transformer Co., Canonsburg, Pa., **$62,000.**

Oregon—Coos Electric Co-operative, Coquille, construct 32.7 mi. 69 kv. rural distr. lines, Coos Co., to Del Monte Electric Co., Box 145, Elmhurst, Oakland, Calif., **$166,889.** Bids 3/9.

Ore., Springfield—City, City Hall, electrical sys., to Montgomery Electric Co., 2375 N. W. Thurman St., Portland, **$177,767.** Awarded 3/5. Rocky Mountain Eng. Co., 1441 Welton St., Denver, Colo., engr.

Pa., Milesburg—West Penn Power Co., Milesburg, design and construction brick, steel frame plant addn., concrete floor and roof constr. to Sanderson & Porter, 52 Williams St., New York, N. Y. Approx. **$250,000.**

South Dakota—Upper Grand River Electric Assn., Bison, Feb. 23, 231 mi. rural distr. lines, Perkins Co., from Zortelli Constr. Co., Ironton, Minn., **$232,025.**

Tenn., Memphis—City, 115,000 volt underground cable sys., to connect 3 and Front Sts. with Northgate Station, from Harrison-Wright Co., Inc., 116 W. 3 St., Charlotte, N. C. **$602,497.**

Texas—Rita Blanca Electric Co-operative, Dalhart, Sect. 2, rural distr. lines, Dallam Co., own forces. **$110,000.**

Tex., Laredo—Central Power & Light Co., 120 N. Chaparral St., Corpus Christi, expansion original electric power plant proj., to A. E. Hinman, Wilson Bldg., Corpus Christi, and Austin Building Co., 1000 Singleton St., Dallas. **$1,500,000.**

W. Va., Riversville—Monongahela West Penn Power Fairmont, design and construction brick, concrete, steel frame power plant addn., to Sanderson & Porter, 52 William St., New York, N. Y., **$12,500,000.**

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Ill., Joliet—Caterpillar Tractor Co., East Peoria, plans by Giffels & Vallett, Marquette Bldg., Detroit, Mich., factory, incl. well, sewer treatment works, main bldg., office bldg. **$7,000,000.**

N. M., Los Alamos—U. S. Atomic Energy Comn., Los Alamos, 2 story, bsmnt., rein.-con., steel type laboratory, air-conditioning, etc., Inv. 291-5059. **$10,000,000-$12,000,000.** Plans deposit $100.

O., Youngstown—St. Elizabeth's Hospital, 1044 Belmont Ave., 225-bed hospital wing. **$7,000,000.**

Pa., Pittsburgh—Behrman & Passell, 5821 Walnut St., plans by Tennyson & Van Wart, 666 Washington Blvd., Zone 16, 19 story steel or rein.-con., brick on cinderblock apartment and store, Webster Ave., and Tunnel St. **$5,000,000.**

Low Bidders & Contracts Awarded

Calif., Los Angeles—Tishman Realty & Constr. Co., Inc., 445 Park Ave., New York N. Y., 12 story office and 2 story garage, Wilshire Blvd., Mariposa Ave. to Irola St., to C. L. Peck, 816 W. 5 St., **$20,000,000.** Claude Beelman, 325 W. 8 St., archt.

Pa., Beverly Hills (Upper Darby P. O.)—Pheasant Farms, Inc., 856 Main St., Darby, apartment and shopping center, Garrett and Marshall Rds., to Turner Constr. Co., 1500 Walnut St., Phila., **$13,000,000.** Karl F. Otto, 1528 Buckingham Dr., Rosemont, archt.

Md., Middletown—Frederick Co. School Bd., 105 E. Church St., 1 and 2 story, bsmnt., 300x380 ft., brick, concrete, steel Middletown High School, to L. J. Keller, Jefferson, **$704,174.** CD 2/13 under LH.

O., Columbus—Ternstedt Div., General Motors Corp., 6307 W. Fort St., Detroit, Mich., steel rein.-con., brick factory addn., Georgesville Rd., to Darin & Armstrong, Inc., 2041 Fenkel St., Detroit, Mich. Approx. **$602,000.**

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PRECISION BUILT
POLE DERRICKS
Available in both steel and light weight aluminum models

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—handles wide range of work. Operates with double drum winch. Derrick head equipped with special cable guide rollers to avoid fraying or shearing cable —increases cable life. Flexible — adapted to trucks 1½ tons and larger. Lift — approx. 22 ft.; handles poles 50 to 55 ft. length.

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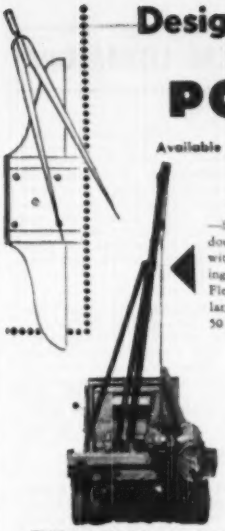

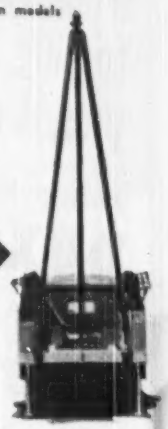

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Dielectric Tests—Dielectric tests on completed apparatus are covered in the report, *Guiding Principles for Dielectric Tests*. A survey of overvoltages encountered in service and existing test values and practices are presented in addition to the proposed principles for selection of test values. Report No. 51 is obtainable upon request to American Institute of Electrical Engineers, 33 W. 39th St, New York 18, N. Y.

NE Code—*The National Electrical Code* includes the 1949 amendments to the 1947 code, marked to show where changes appear, together with official interpretations and examples. There is also an index to electrical provisions of other fire protection standards for application of the code to special occupancies. The book is available at $3 from the National Fire Protection Association, 60 Batterymarch St, Boston 10, Mass.

Symbols—Distinctive typographical standards for distinguishing between scalars, phasors (complex quantities), and vectors are set up in *Letter Symbols for Electrical Quantities*. A principle governing the sequence of double subscript notation has been adopted. Publication Z10.5, priced at 30¢ to members, is issued by the American Institute of Electrical Engineers, 33 W. 39th St, New York 18, N. Y.

Refrigeration—Data on the construction and application of different types of valves and switches used for refrigeration control are presented in *Refrigeration Controls*. Function and operation of injectors, pumps, and many of the valves used in the evaporator are explained. Price for pamphlet AD 47 is 45¢, available from American Society of Refrigerating Engineers, 40 W. 40th St, New York 18, N. Y.

Building Wire—*Standards for Thermoplastic Insulated Building Wire and Cable, 0-600 Volts*, provides information concerning Types T and TW. Topics include dimensions, insulation, physical and aging requirements, and testing and electrical requirements. Price for Publication RV1-1949 is 90¢, from National Electrical Manufacturers Association, 155 E. 44th St, New York 17, N. Y.

Safety Code—National Electrical Safety Code, Part 2 and Discussion, is National Bureau of Standards Handbook H42 and is the fifth edition of *Installation and Maintenance of Electric Supply and Communication Lines Safety Rules and Discussion*. The publication is obtainable from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at $1.50 per copy.

Electrical Units—*Establishment and Maintenance of the Electrical Units*, by F. B. Silsbee is National Bureau of Standards Circular C475 and reviews the origin and evolution of the standards prior to the International Convention of January 1, 1948. The booklet may be obtained from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 35 cents per copy.

Cable—Numerous photographs explain the larger portion of the research, manufacturing, and testing processes involved in wire and cable fabrication in *The Story of Rome Cable Corporation*. This 49-page booklet is available from Rome Cable Corp, Rome, N. Y.

Measuring Instruments—A compilation of Swiss small instrument manufacturers and their products appears in *Die Feinmechanik und Industrie der Messinstru-*

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ments in der Schweiz. This directory includes precision instruments for: counting, dimensional measurements; weight; time; velocity; force, pressure, work, power; heat; solid bodies; gases; optics. Publisher of the booklet is Verlag fur Wirtschafterliteratur F.m.b.H., Zurich-Heuried 55, Switzerland.

Connectors and Splices—Required electrical and mechanical characteristics, rather than design details, are given in *Tentative Specifications for Line Connectors and Splices.* Specifications cover bolter or clamp-type connectors (non-tension), splices (tension and non-tension), and hot line connectors used for making electrical connections between solid or stranded conductors. Publication TD-72 1949 is issued by the Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

Bolts and Nuts—*Specifications for Steel Bolts and Nuts,* as approved by the Transmission and Distribution Committee of EEI, are intended for use by member companies as an aid in preparing their own specifications for these materials. Covered in the specifications are carriage bolts, machine bolts, double-arming bolts and nuts commonly used in overhead line construction. Copies of TD-1 1949 are issued by Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

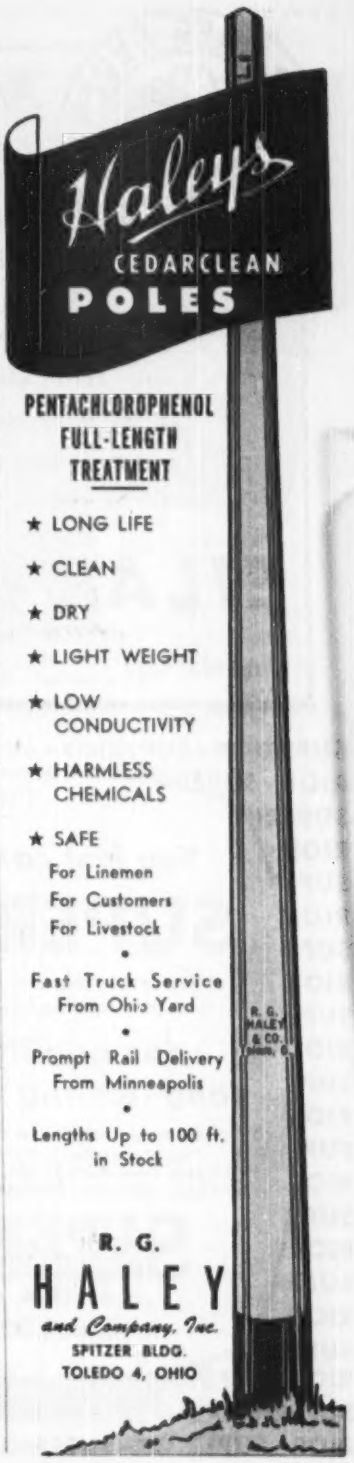
Cable Selection—The method of determining cables and cable sizes of asbestos-varnished cambric cables, Types AVA, AVB, and AVL, are presented in *Selection of Proper Cable Sizes.* Step-by-step instruction is given on figuring load current, voltage drop, cables, and cable sizes for both lighting and motor loads. Reference tables are included to simplify these computations. The booklet, No. 19-269, is obtainable free of charge from the General Electric Co, Construction Materials Dept, Bridgeport, Conn.

Brazing—Information about the brazing process, brazing materials, and brazed joints appears in No. 4, Vol 4, of *Tempil Topics* published by Tempil Corp, 132 W. 22nd St, New York 11, N. Y.

Armored Cable—*NEMA Standards for Armored Cable and Armored Cord* contain information concerning the conductor assembly, armor, physical and electrical tests, markings, and type designations of armored cable and cord. Types AC, ACH, ACU, ACL, ACHL and CA are included. The 22-page standard, No. AC1-1949, priced at $1, can be obtained from National Electrical Manufacturers Association, 155 E. 44th St, New York 17, N. Y.

Motors and Generators—The first half of *NEMA Standards for Motors and Generators* covers ratings, dimensions, tests and performance characteristics, frame assignments and application data for fractional and integral-horsepower motors rated 200 hp and less. The second half of the book is devoted to definite-purpose motors, integral-horsepower and synchronous motors, dc generators, synchronous generators, high-frequency industrial motors and motor-generator sets. Priced at $5.75, the 208-page publication, No. MG1-1949, can be had from National Electrical Manufacturers Association, 155 E. 44th St, New York 17, N. Y.

Shunt Capacitors—*NEMA Standards for Shunt Capacitors* contains standards for the rating, manufacturing, testing, application and operation of (1) capacitor units of 0.5 kva and larger for low-frequency ac applications and (2) assemblies of capacitor units with accessories and control to form complete capacitor installations. Publication No. 45-100 is priced at $1.50 by National Electrical Manufacturers Association, 155 E. 44th St, New York 17, N. Y.



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● RECTIFIER: Information about mechanical rectification for applications up to 10,000 ampere unit in the 50 to 400-v range is provided in No. 12, Vol. 19, of "Itemite". I-T-E Circuit Breaker Co, 19th & Hamilton Sts, Philadelphia 30, Pa.

● FIXTURES: Bulletin 30-A-3 is available describing the Day-Line industrial fixtures; the all-metal Lenox-2 fixtures are described in Bulletin 10-E-1, and the Luvex for slimline lamps in Bulletin 10-M. Day-Brite Lighting, Inc, St. Louis 7, Mo.

● METAL DETECTOR: Design and operation of an electronic metal detector intended to safeguard non-metallic products, is covered in a 20-page bulletin, 14B7217A. Allis-Chalmers Mfg Co, 8 70th St, Milwaukee, Wis.

● CABLE, WIRE, CONDUIT: Technical data on electrical cable, building wire, and conduit raceways in addition to production methods and wiring information are offered in the 86-page General Catalog No. 500. Triangle Conduit & Cable Co, Inc, 1900 Jersey Ave, New Brunswick, N. J.

● CONTROLS: Forty-five case studies describing "actual examples of cost-saving production techniques" appear in a book, "Cutting Production Costs with Electronic Controls." Photoswitch, Inc, 77 Broadway, Cambridge 42, Mass.

● SWITCHES: Data and wiring diagrams concerning Alduti interrupter switches and XL regulator switches are provided in two booklets. S&C Electric Co, 4435 Ravenswood Ave, Chicago 40, Ill.

● TUBES: Information on radio and television tubes and batteries, as well as service data, is presented in the 1950 edition of the "Tube Reference and Calendar Notebook." The book is available from Radio Corp of America, RCA Victor, and Cunningham tube distributors.

● FIRE EXTINGUISHERS: The Ansul line of fire extinguishers and trucks is shown in Form No. F4993. Characteristics of hand fire equipment and comparative effectiveness graphs are included. Ansul Chemical Co, Marinette, Wis.

● LIGHTING KIT: A scale rule, three planning grids, and instructions comprise a kit for designing Module lighting installations. Mitchell Mfg Co, 2525 N. Clybourn Ave, Chicago 14, Ill.

● MULTI-BREAKER: The Ad-On multi-breaker is described in a folder, MS-24. Cutler-Hammer, Inc, 315 N. 12th St, Milwaukee, Wis.

● CONNECTORS: Connectors, lugs, Uniclamps, multitaps and Cantfreeze clamps are described in bulletin 206-A. W. N. Matthews Corp, St. Louis 16, Mo.

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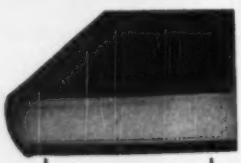

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LETTERS TO THE EDITOR

Want to Swap?

To the Editor of ELECTRICAL WORLD

No doubt you have received many letters in the past from readers over here in England. I myself have been quite fortunate in obtaining back copies of your excellent electrical magazine and I would like to point out how much I enjoy reading them. I hope I am not being too presumptuous in asking if one of your readers would care to correspond with me with the view in mind of exchanging some of his American edited electrical magazines with my English electrical issues.

I am employed over here as an area sales representative for one of the leading lighting and radio companies in Great Britain. Therefore I find the articles and editorials most enlightening and refreshing.

F. J. Wildbore

65 Blissett Road
Leicester, England

Water Heating Peaks

To the Editor of ELECTRICAL WORLD:

The title and the stress in H. E. Antle's article "Controlled Water Heating Causes 'Off-Peak' Peak" seems to me to be misleading and not in keeping with the conclusions drawn.

I believe the important thing indicated by this test is that the maximum demand per water heater was reduced by an average of 460.8 w by time control. In the two weeks when the time control on the heaters was accurately set with ⅓ on one schedule and ⅔ on a different off peak schedule, the saving in maximum demand reached 512 w per heater. These figures check very well with tests previously made in other sections of the country which show a saving in demand of from 500 to 800 w per water heater when time controlled.

It is undoubtedly true that when water heaters are reconnected to the line after an on-peak period a large portion are energized. One recent test indicates that 75% of the water heater load is picked up after a period of three hours when they have been disconnected. This should not be alarming even with very high saturations as staggering of the beginning of the ON period can prevent a peak which would be more than the peak caused by loads other than electric water heaters. Some sources even question the necessity of accurate setting of time switches and aver that so long as water heaters

are disconnected for a given total number of hours each day, the natural diversity of times and durations of interruptions will give the desired reduction of peak demand.

It is also questionable whether extremely high saturations of water heaters will appreciably alter the economies of time switch control. Constantine Barry of the Philadelphia Electric Company in his article appearing in the May 22, 1948, issue of ELECTRICAL WORLD points out that when the ratio of ranges to water heaters is 2 to 1 that the load factor is about 38% from 3% saturation to 50% saturation without control while with time switch control load factor gets to 49% at 21% saturation and drop but gradually to 44% at 50% saturation.

The data collected by the Boone County REMC is most illuminating and confirms similar data taken in the past on both rural and urban systems. Its true significance is not represented in the title. Rather, the stress should be: "Time Control for Electric Water Heaters Reduces Peaks."

James H. Patton
Sales Manager
Utilities and Industrial Division
Sangamo Electric Company
Springfield, Illinois

Counter Shock

To the Editor of ELECTRICAL WORLD:

I read with much interest in your ELECTRICAL WORLD NEWS ISSUE for February 20, 1950 of the investigation proposed in pulling the heart out of fibrillation after shock.

Being a layman, an electrical engineer and chief load dispatcher for the Wisconsin Public Service Corp for over 25 years, I have been much interested in the development of safety devices and I am, therefore, venturing a suggestion even though I trod unfamiliar ground.

It seems to me that in our present methods of resuscitation, we do not get any reflex response because of the lack of nerve coordination and consequently there is no pulsating control to the heart.

Since this is necessary to overcome fibrillation, why not try to make an artificial pulsation by means of a high frequency shocking device made up of a vibrator and a few dry cells. Have an alarm clock device with a drum or timer that would administer about 72 impulses per minute. This would in turn be active in tensing and releasing the nervous system and might thus restore the involuntary impulses of the heart. It would, I think, be worth while to carry on biological experiments along these lines.

R. J. Pech
Green Bay, Wisconsin

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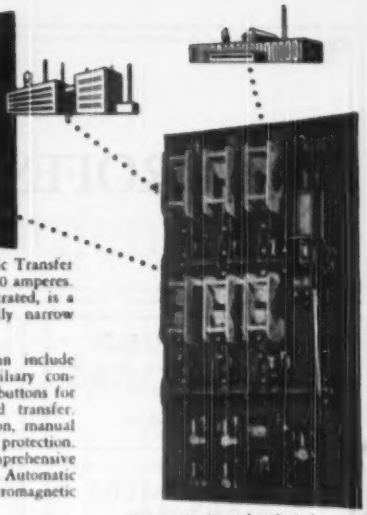

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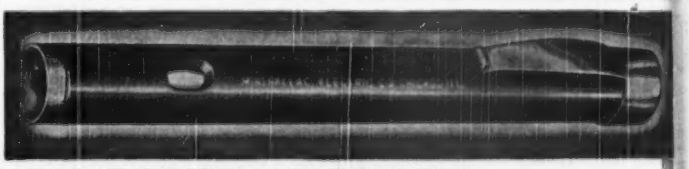

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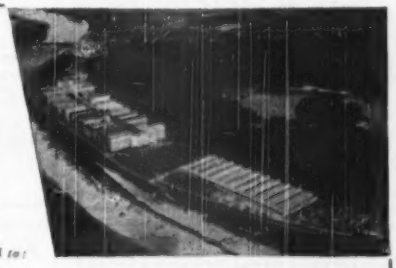

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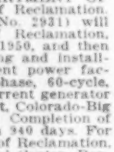

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3—	333 KVA G-E	11000-2300/4000Y
3—	333 KVA G-E	2400/4160Y-240/480
1—	250 KVA G-E	6900/11950Y-230/460
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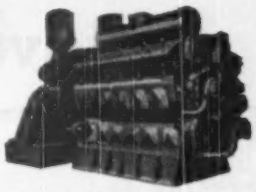

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1280	General Motors	16-278A	1600	720	312	General Motors	6-268A	450	1200
887.5	General Motors	12-567	1080	720	250	Clark	MD-4	375	257
625	Alco	6-12¼x13T	750	600	187	Ingersoll Rand	8	225	514
435	Baldwin	VO-6	510	450	125	General Motors	3-268A	150	1200
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300	G.E.	Non-condensing 160/175 I.S.P. & 10 B.P.—480 v. 3 ph. 60 cy.
600	Whse.	Non-condensing 125/150 lbs. I.S.P. & 10 lbs. B.P.—240/480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
8160	Whse.		2400/4156	600
4000	G.E.	TSC	2400/4160	900
3000	Whse.		2400/4800	750

MOTOR GENERATOR SETS
3 ph. 60 cy.

			DC	AC
KW	Make	Speed	Volts	Volts
1000	G.E.	900	125/250	2300/4150
1000	G.E.	360	275	2300/4400
1500	G.E.	600	600	2300/4150
1250	G.E.	600	275	4150
1000	Whse.	900	275	4150

TRANSFORMERS—60 Cycle

Kva	Make	Type	Ph	Voltages
2500	Whse.	OISC	3	66000x11500
2500	Al. Ch.	OISC	3	13200x2300
2500	Pack.	AP	3	13800x2300
1250	G.E.	HVDDJ	1	66000x4160
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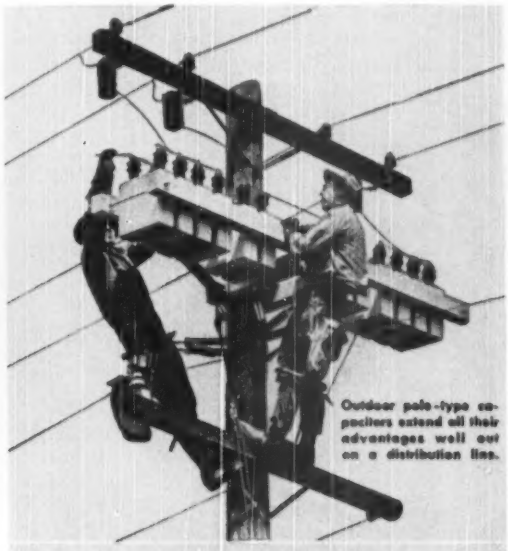

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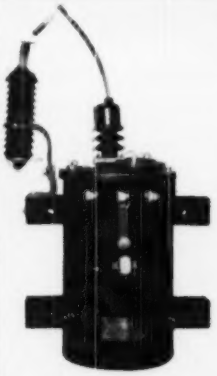

Conventional type with external fuse and arrester combination. This type affords economical surge and overload protection. Is particularly suited for use where full utilization of the short-time overload capacity of CSP transformers is not required.

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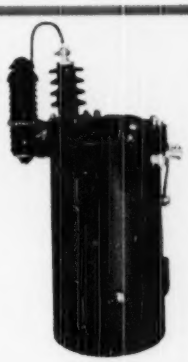
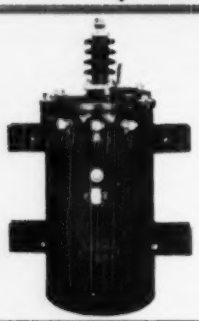
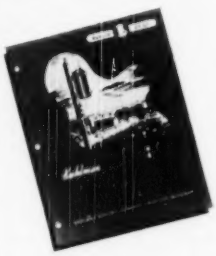


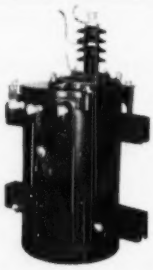


Conventional type. Utilizes standard Kuhlman core and coil assemblies. Is equipped with single cover primary bushing, three secondary stud bushings, two position pole mounting hangers, two grounding studs, internally operated tap changer, hand hole in cover.



Write today for this new Kuhlman Rural Bulletin CS-401. Complete with illustrations, construction data, weight and dimension details. Kuhlman also manufactures a complete line of distribution, power, dry type, street lighting and specialty transformers. Bulletins available upon request.

Conventional type with double gap and internal fuse. Inexpensive lightning protection is provided by the external bushing mounted horn gap. Any follow current established by lightning flashover is usually interrupted by circuit reclosers on the line. Internal fuse link provides protection for the line in case of transformer failure.



EXPERIENCE COUNTS — THIS IS OUR 56TH YEAR

Kuhlman

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN

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